July 19, 1934

Engineering News-Record

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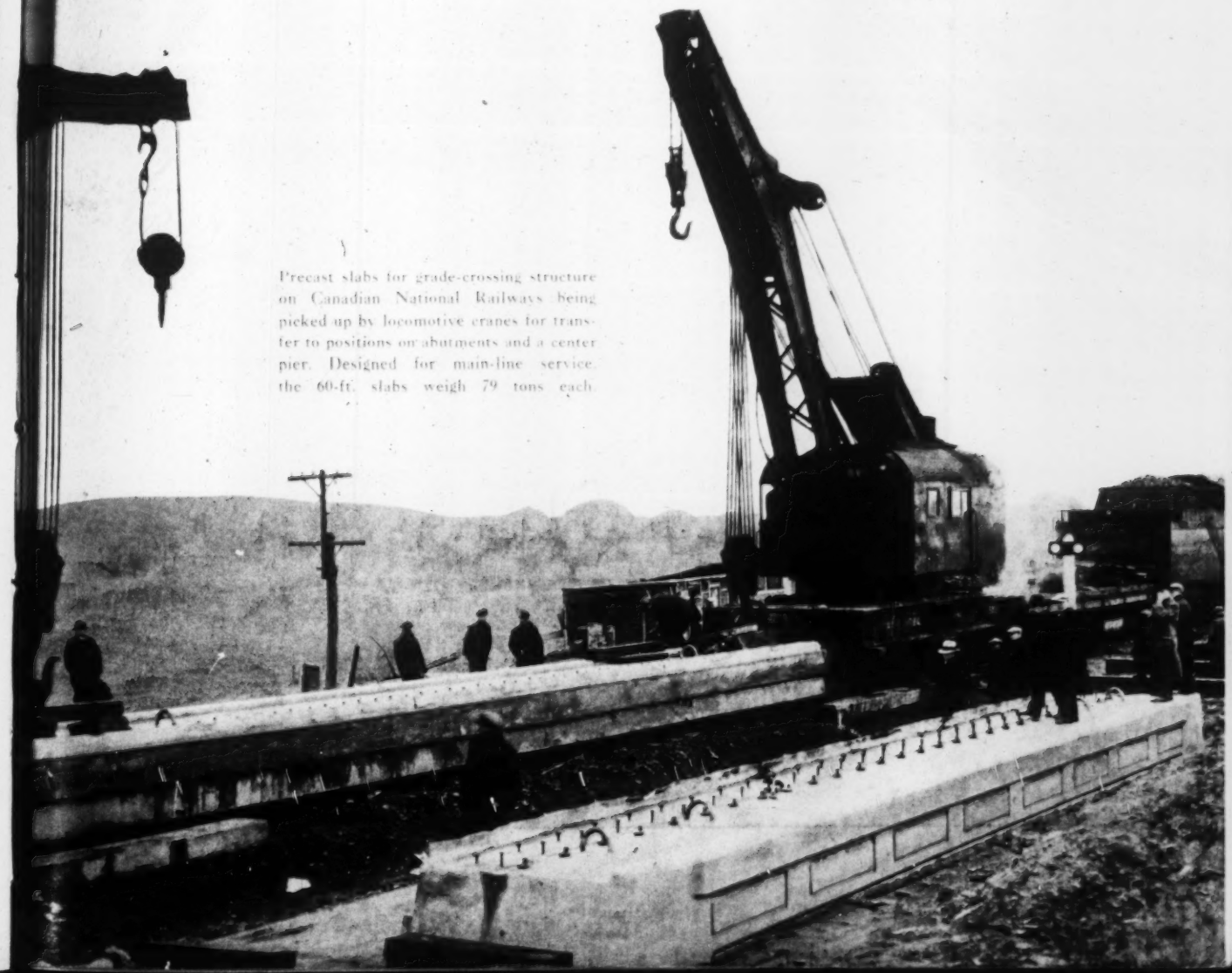
Grade-Separation Structures on the C. N. R.

Construction in the West—From an Editor's Notebook

Slump Honeycomb Relationship in Paving Concrete

Some Basic Principles of Grain Elevator Design

A.S.C.E. Summer Meeting in Vancouver



Precast slabs for grade-crossing structure on Canadian National Railways being picked up by locomotive cranes for transfer to positions on abutments and a center pier. Designed for main-line service the 60-ft. slabs weigh 79 tons each.

No place for experiments

IF ever a machine needed proved bearings and tried operators, it is on the type of construction job shown in this picture. » » »

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NEW DEPARTURE

BALL BEARINGS

After NRA, *What?*

THE time has come for American industry to view the NRA and its codes from a new angle. Heretofore they have been discussed, commended or condemned on their merit as emergency measures; from now on we must look forward rather than backward and try to appraise the whole undertaking as but an experimental step toward more stable industrial organization.

The National Industrial Recovery Act, which established NRA, now has less than a year to run. Next June the codes expire by provision of the statute. It is futile, therefore, to prolong the controversies that have arisen out of the creation and administration of the present codes under the conditions that have prevailed hitherto. Rather should each industry be studying earnestly and dispassionately its experience with its emergency code so that, at the conclusion of the emergency, it can help to write a charter and set up an administrative structure that will serve it constructively on a long-term basis. When the Congress convenes next January all this will claim its prompt consideration; it is not too early for industry to consolidate its own ideas against that day.

Most essential, in approaching this effort, is the need to rid our minds of the psychology of emergency. Drawn during a period of desperate anxiety, many codes reflect the thinking of industries in which the one concern of the moment was that of survival. Little thought was vouchsafed to long-term considerations. This was quite in order at that time but it would be a capital mistake to perpetuate in a constitution for American industry policies and expedients that might be tolerated during a period of stress. When the ship is foundering, a lifeboat is mighty reassuring and helpful, but we should be foolish to set forth on a long voyage with no better craft than a lifeboat.

One subject that demands reconsideration on this score is that of price control. During the period of thin markets and destructive price chiseling, many code provisions were formulated to help maintain prices at reasonable levels. Even during the emergency some of these have incurred criticism so bitter that they have been radically revised or completely eliminated. But whatever may have been the emergency justification for such provisions, it will be evident that no long-term program of industrial control, with or without governmental participation, dare interpose substantial interference with the operation of normal supply and demand on the price level. Here there is need for the clearest vision and the straightest thinking available in each industry to formulate a long-term program that will protect its legitimate producers against destructive price-cutting while at the same time it permits that free fluctuation of fair prices which alone insures the practical operation if not the survival of a capitalist economy.

Related to this is the control of production and of the expansion of capacity. However desirable it may have been during the emergency to safeguard existing investments against the hazard of general collapse, there can be no doubt that a continuing policy of restricted production or arrested expansion will tend to freeze our standards of living, kill technical progress and destroy the one essential motor of the existing economic order. Here again is a challenge to industrial statesmanship; it must provide against predatory and wasteful expansion, while at the same time it avoids laying a blight on natural and healthy growth.

No one who believes in capitalism as the sound basis for our continued progress can afford to go wrong on these issues. The very existence of the present order hinges on these two points: first, a continuous increase in productivity to provide the greater abundance that is indispensable to higher standards of living and second, a free price level that will reflect promptly the efficiencies and economics of improved plant and management, thereby creating larger volume and earnings by expanding the number of potential purchasers.

These and many more problems of reconstruction now confront those who must organize industry to realize the long-term benefits of the New Deal. We shall do well to turn away now from the expedients and the controversies of our emergency effort and bend our most constructive thought toward sound and enduring measures.

Willard Chevalier

NRA CODE 1934

ENGINEERING NEWS-RECORD

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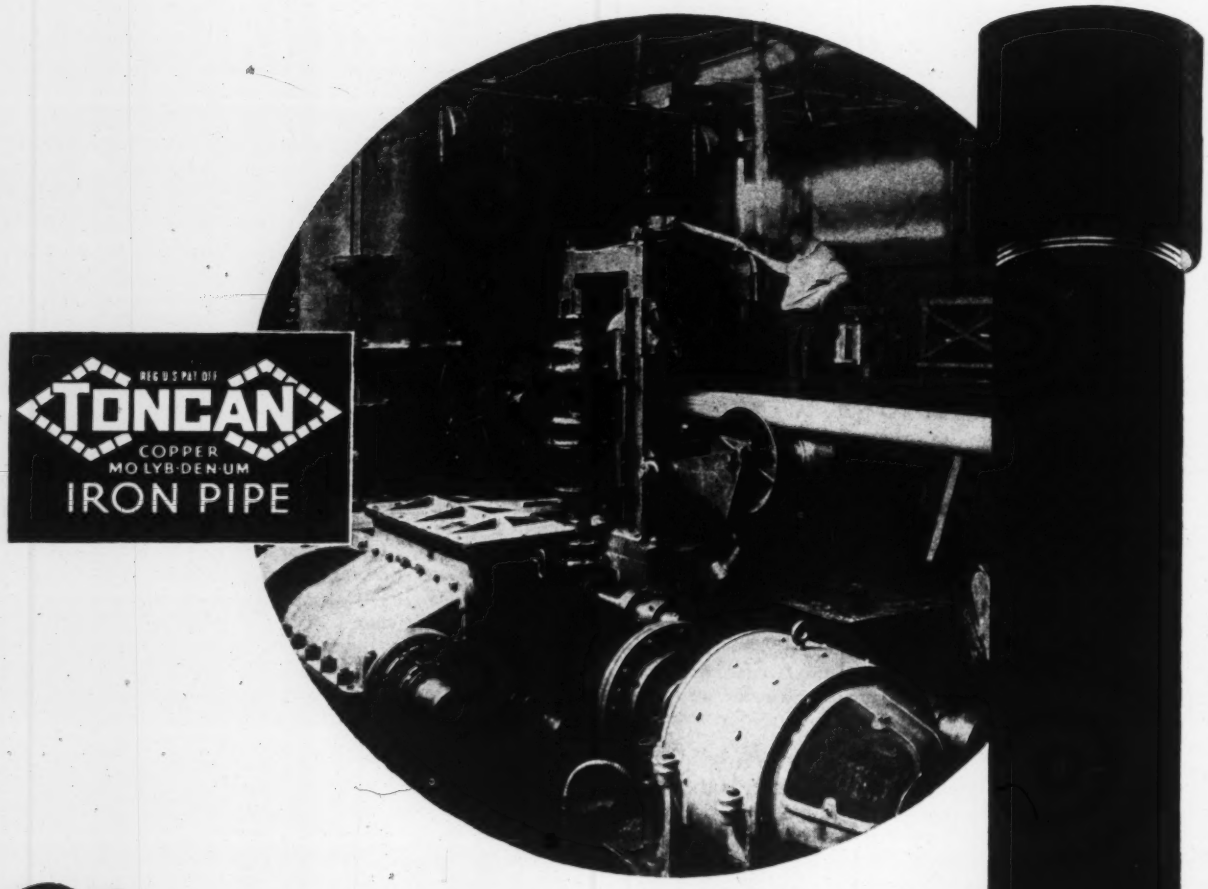

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In the News:

SHIFTING THE EMPHASIS from non-federal back to federal work this week, PWA Administrator Ickes announced "second-year" allotments of over $100,000,000 to projects put under way during the year with an "original" allotment. Among the large ones were Fort Peck Dam, $25,000,000; Missouri River dikes and revetments, $16,736,000; upper Mississippi River locks and dams, $17,000,000; Lake Okeechobee (Fla.) flood control, $3,700,000; All-American Canal, $3,000,000; and Bonneville Dam, $11,000,000.

LOW-COST HOUSING (the large-scale type sponsored by PWEHC and not the new and modernized houses proposed by the new Housing Administration) came back into the news with the announcement that an appraiser has been sent to New York and one will soon go to Chicago, to examine proposed sites. The housing corporation has earmarked $25,000,000 for each of these cities.

THE CODE AUTHORITY for the general contractors' division of the construction industry, now that its financial budget has been approved, is undertaking a nation-wide check of all contracts in excess of $2,000, in order to secure 100 per cent registration and the 0.1 per cent assessment that is due.

RIVER WORK began on the Midtown Tunnel in New York this week, when the caisson for the offshore ventilating shaft at 39th St., on the New York side, was floated into place. According to boring data, the cutting edge will be brought to bear on rock at 98 ft. below mean high water.

A NATIONAL power policy committee has been established by President Roosevelt to chart a course for the federal government's venture into the electric-power development business. To date, the only part of that venture to have a course laid down for it is power-development work of the Tennessee Valley Authority. Nobody has been set up to decide upon rates and selling policies for the power to be developed at Bonneville Dam and Grand Coulee.

THE BAY BRIDGE PROJECT between San Francisco and Oakland was one year old on July 9, measured from start of construction. Work was six months ahead of schedule. The contractors have earned $11,500,000, or 31 per cent of the amount of the contracts. More than 7,000 men are employed directly on the various units of the job.

LOS ANGELES will start work this month on its Mono Basin water project, designed to augment the supply in the present Owens Valley aqueduct. Principal construction will involve a 13-mile tunnel and a dam in Long Valley. The cost will be about $13,000,000.

In This Issue:

RAILROAD grade-separation structures have been given special attention by Canadian National Railways engineers with the result that seven distinct designs have been developed. Unique features are precast slabs, ballastless decks and concrete ties. All are designed for an E-60 live load. One is a 72-ft. span rigid frame, the longest yet built for railroad loadings.

GRAIN-ELEVATOR DESIGN is a specialist subject that receives scant attention in engineering literature. In this issue L. Boyd Mercer, who has designed and built elevators in North and South America and Australia, reviews some of the basic principles and outlines some of the ways to apply them for maximum economy.

THE RELATIONSHIP between slump and subsequent honeycomb in paving concrete has been investigated and analyzed by the Bureau of Public Roads, with the conclusion that the advantages in high strength obtainable with a low water-cement ratio may be entirely offset by the honeycomb that often results from ordinary machine-finishing of such low-slump concrete. A 2- to 3-in. slump is recommended.

IMPRESSIONS of the unprecedented construction activity in the Western states, gained on a two-months trip that embraced all of the large projects west of the Rockies and east to Fort Peck, are set down in this issue by F. E. Schmitt, editor of *Engineering News-Record*. Symbols of a new expansion, bold and picturesque, inspiring in design and construction, such projects as Casper-Alcova, Bonneville, Grand Coulee and Fort Peck, nevertheless raise many doubts as to economic justification. Furthermore, Mr. Schmitt found they had done little as yet for business recovery.

VANCOUVER, B. C., was the scene last week of the joint meeting of the American Society of Civil Engineers and the Engineering Institute of Canada, with the current developments on the Columbia River at Bonneville and Grand Coulee receiving major attention. Vancouver and British Columbia projects were also accorded prominent places. A 4-page staff report is published in this issue.

Coming Articles:

HOW MUCH of Soviet Russia's first five-year plan of construction was accomplished? Vastly different estimates of the achievement are current. Soviet figures have been presented in such a way as to cause confusion. Beginning in the issue of Aug. 9, *Engineering News-Record* will publish in a series of three articles a trenchant analysis of the policy, procedure and accomplishments of the five-year plans for Russian rehabilitation by construction. These articles are based on an analysis of actual statistics by an experienced American construction engineer who was engaged by the Soviet government as consultant in carrying out parts of the work.

WHEN IT'S CONCRETE

And You've Got to Make It

GO!

SOMETIMES you get a job where everything *has* to click—when every detail *must* be right, the first time—when you have to *drive—hard*. Then is when you give a lot of thanks to the years you've spent wrestling with every sort of tough job—to the experience that has taught you kinks and tricks—to the hard-won, drilled-in *knowledge* that a good construction man learns and keeps.

We'd be presuming a lot to suggest that we've got anything in our files or books that can tie that kind of knowledge. And we don't say that. What we do say is this—when you're working on one of those jobs that have to GO, and there's a question on concrete that has to be answered *right* and *quick*—if we can help out, we want to.

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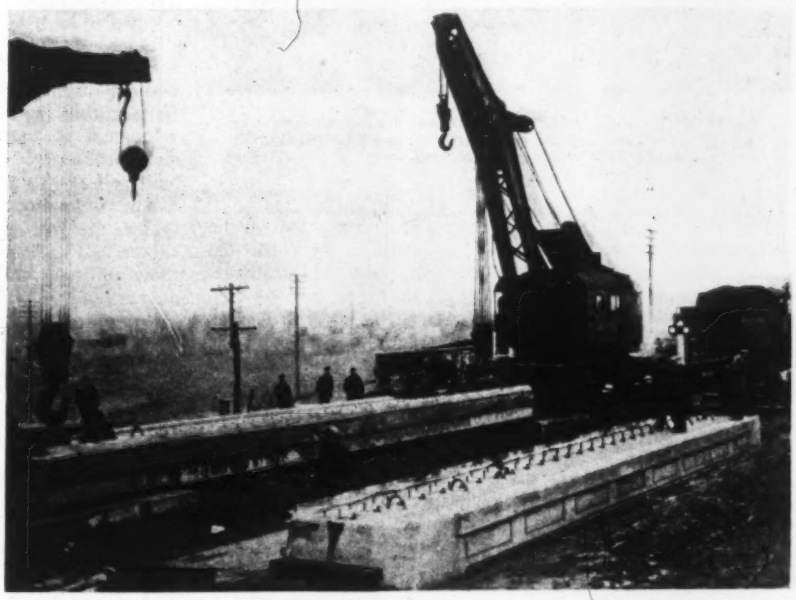


FIG. 1—PRECAST BALLASTLESS DECK SLABS ready to be moved by locomotive cranes to position on prepared foundations. On this structure, at St. George, Ont., the 60-ft. slabs are continuous over but not attached to a center pier.

Railroad Grade-Crossing Structures to Meet Every Requirement

Canadian National Railways has developed six different designs in concrete and one in steel and concrete incorporating such innovations as precast slabs, ballastless decks, concrete ties, timber cushion blocks and long-span rigid frames

ON THE Canadian National Railways, as on railroad systems in the United States, the past ten years have witnessed a great increase in grade-separation work and continuous advance in structure design. But the C.N.R., particularly in the Central Region around Toronto, has surpassed all other roads in the freedom of its design thinking and in the innovations it has fostered. The result, to date, is that the C.N.R. engineers have at their disposal six designs for concrete grade-separation subways (bridges that carry the tracks over highways) to meet every requirement that is likely to arise and that have proved their economy and efficiency in actual service.

Briefly, the six different concrete designs are identified as follows:

1. Simple poured-in-place concrete slabs on gravity abutments, in single spans up to 60 ft., with rails fastened directly to the slab and no ballast.

2. Same as design No. 1 except that the slab is precast. For single spans up to 60 ft.

3. Poured-in-place slab, continuous over but not attached to a center support, with concrete ties and no ballast. Spans up to 50 ft., total slab length not over 110 ft.

4. Precast slab continuous over but not attached to a center support, without ties or ballast. Spans up to 45 ft., total slab length not over 96 ft.

5. Poured-in-place rigid frame continuous over but not always attached to a center support; concrete ties but no ballast. Spans over 50 ft. and up to 100 ft. For spans over 65 ft. the slab is tied to the center pier.

6. Single span, poured-in-place rigid frame, no ties and no ballast. For clear spans up to 100 ft.

A seventh type consists of a half-through steel-plate girder and a ballastless concrete deck with T-beam stringers under each rail, no ties being used. All types are designed for Cooper's E-60 live loading.

The distinguishing characteristic, common to all of these designs, is the entire elimination of ballast. Several

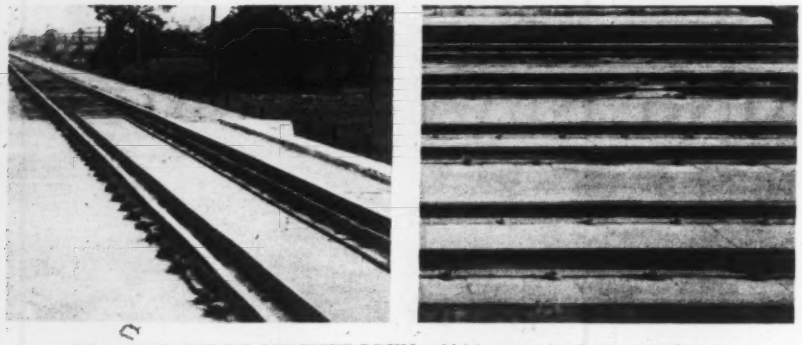


FIG. 2—BALLASTLESS CONCRETE DECKS, which conserve headroom and eliminate maintenance expense on C. N. R. bridges. At the left the rails are anchored directly to the slab. At the right concrete ties are used.

methods are used to fasten the rails to the deck, but in no case are the conventional timber ties and ballast carried across the structures.

Design types 3 and 5 (Fig. 4) utilize precast concrete ties with the necessary rail fittings cast into them. The ties, 10½ ft. long, are placed on the finished surface of the concrete slab, the rails fastened to them and the spaces between the ties filled with a lean concrete, furnishing a continuous flat surface over the whole track structure (Fig. 2, right). On tangent, the ties are 12 in. wide by 5 in. deep, while on curves the depths are tapered from end to end, providing the necessary superelevation. Reinforcing consists of five ¾-in-square longitudinal bars and seven ¼-in.-diameter stirrups. Grooves under the rail locations provide for installing thin oak blocks or cushions.

In all of the other designs no ties whatever are used (Fig. 2 left and Fig. 3), but the rails are set directly on longitudinal oak sleepers or cushion strips, installed in grooves in the deck slab 5¾ in. wide and ½ to ⅞ in. deep. The oak strips are tapered from about 1 in. to ¾ in., to provide the desired cant in the rails. Rail anchors are placed either side of the strips on 2-ft. centers. These anchors consist of clips held by ¾-in. bolts screwed into sleeves embedded in the slabs. Guard-rails consist of 5x4x¾-in. angles anchored in the same way as the rails.

The designs have other common characteristics, all of which offer advantages and have been adopted for that reason. For example, a relatively thin deck, from base of rail to top of underclearance, is obtained on all types, specifically either by using a center pier or by making the slab and abutment integral (rigid frame), thus reducing the positive moment and therefore the slab thickness near the center of the span.

Slab thickness in subway design is the most important dimension from the economy standpoint. The one dimension that is always fixed in subway design is the distance from the top of the finished highway to the under side of the structure, which may not be less than 14 ft. To keep the base of the rail as low as possible, therefore (in order to cut the cost of drainage, sewers, property damages, and so on), deck thickness must be kept at a minimum. The inherently thin deck of the several designs, together with the absence of ties and ballast, effects a saving of 15 to 18 in. over decks on conventional structures. One case has been cited in which every inch of height that was saved in the depth of the subway meant a saving of $100,000 in the grading of an adjoining yard terminal containing several hundred tracks. A saving of 15 in. in headroom, by the adoption of one of these structures, would therefore have effected a saving of $1,500,000.

It is the experience of the C.N.R. that the riding qualities of the track on the bridges are easily the best on the system. Also, experience has shown that there is no shock when the train comes off the approach grade onto the bridge. The track is unusually silent, due partly to the oak cushion block and partly to the insulating effect of the heavy mass of concrete in the deck itself.

One of the principal advantages is the almost complete elimination of maintenance expense, there being no ties to be renewed and no ballast to be cared for, while dirt that collects on the deck is easily removed with a hose or broom.

An important technical feature of the structures, and one that has contributed to their economy, is that the reinforcing steel can be shop-fabricated into units that are easily and accurately placed. This results from the fact that most of the designs have both tensile and compressive reinforcing, with diagonal shear bars between. The assembly of these bars, by spot-welding into trusses, has, on one job, resulted in a saving of six days' time over a comparable job in which the reinforcing had to be wired in place in the field.

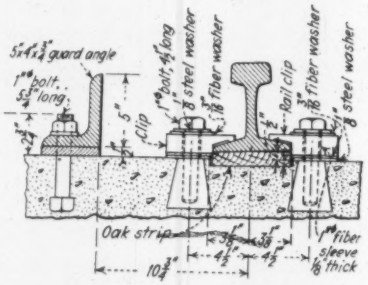


FIG. 3—RAIL-FASTENING DETAILS for a typical ballastless deck without ties. The same details are utilized when concrete ties are used.

Some of the designs offer the advantage that they may be constructed without interfering with railroad traffic. In fact, this requirement led to the development of the precast slab designs and to the rigid frames that may be built half at a time on double-track lines.

The following brief descriptions of typical designs, examples of which are shown in Fig. 4, provide added proof of their unusual character and potential advantages.

Poured simple slab

A poured-in-place simple slab bridge has been in service for three years at St. Lambert, Quebec (Figs. 4 and 5). The over-all length of the slab is 58 ft. on the skew, giving a clear unobstructed roadway of 42 ft. at right angles to the face of the abutments. The total thickness of the slab is 4 ft. Since there are no ties or ballast, this figure is the distance from base of rail to under side of structure.

Precast simple slab

This design, involving precast slabs lifted into position between trains by two locomotive cranes, is for single spans only. Its features are essentially those of type No. 4, a two-span design, which is described in detail below.

Poured continuous slab

An example of the cast-in-place slab, continuous over but not attached to a center support (type 3 in Fig. 4), exists in the Richmond St. subway, London, Ontario. The extreme length of the slab is 73 ft. 9 in., and the depth from base of rail to under side of slab is 3 ft. The bridge carries thirteen railway tracks, one 24-ft. roadway, one 3-ft. 9-in. sidewalk on the north side and one 8-ft. sidewalk on the south side. Clear spans of 31 ft. are provided on both sides of the center pier.

After the concrete slab was completed, precast concrete ties 5 in. deep, with the necessary rail fittings precast into them, were placed on the finished surface of the slab, and the spaces between filled with concrete. The reason for using concrete ties resulted from the fact that the bridge was in the center of a terminal yard and it was necessary to have some freedom in lining up the tracks after the subway was built; if the rail fittings had been cast into the slab itself, changes in track alignment would have been difficult.

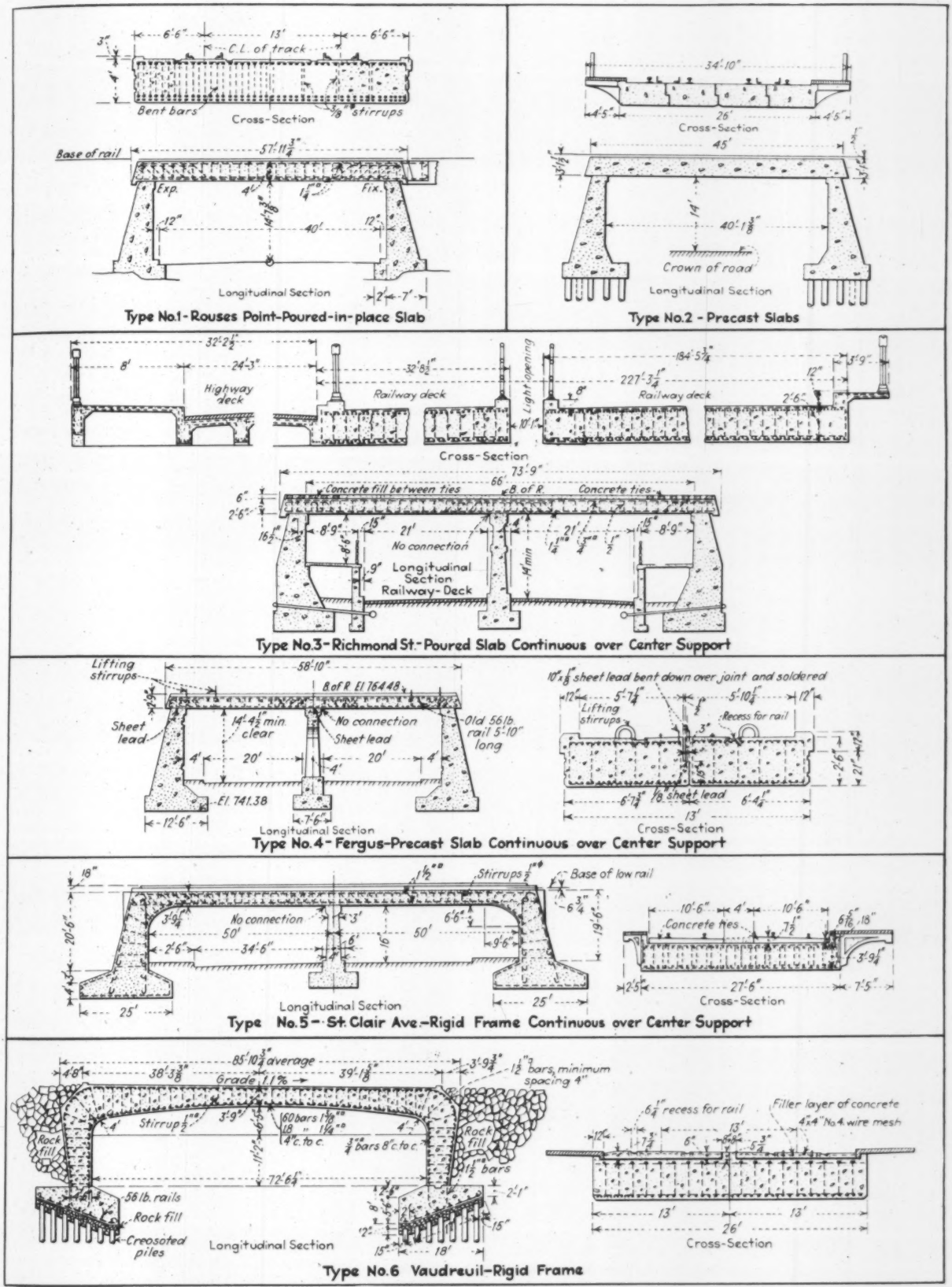


FIG. 4—SIX DESIGNS FOR CONCRETE GRADE-SEPARATION STRUCTURES ON THE CANADIAN NATIONAL RAILWAYS
(For clearness, steel reinforcement is not completely shown.)

FIG. 5—POURED-SLAB STRUCTURE for a location at St. Lambert, Quebec.

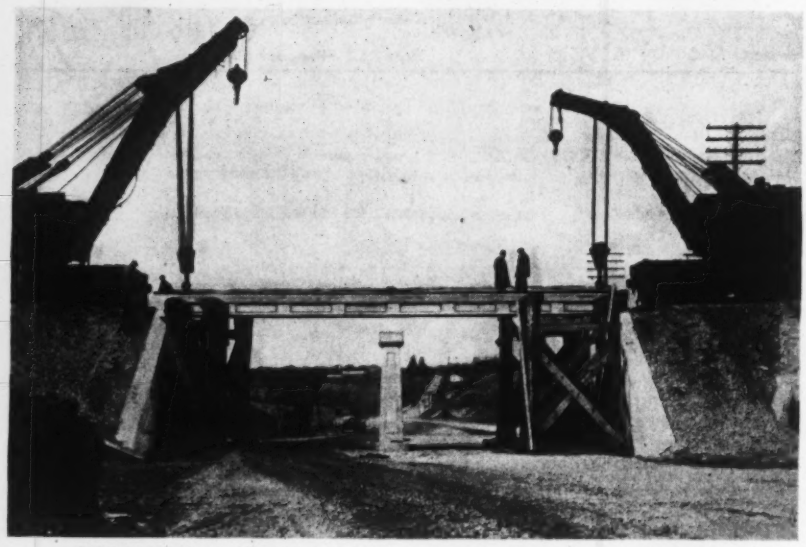


FIG. 6—SETTING PRECAST SLABS in position for the grade-separation structure at St. George, Ont.

Fortunately, the increased 5 or 6 in. of depth from the base of the rail to the under side of the slab, occasioned by the use of the ties, did not cause serious alterations in the grades of the terminal tracks.

Two special details were incorporated in this bridge. One involved the extension of the deck slab several inches beyond the abutment to permit the deck drainage to be carried away from the abutment and through dry packing into subdrainage pipes connected with the city sewers. The other detail involved spreading the bases of the abutments inward toward the roadway instead of outward. The sidewalks beneath the bridge were raised several feet, as shown in Fig. 4, and are reached by ramps at either end. The expedient of spreading the abutments inward reduced grading for the sidewalks and saved excavation for the abutments, without reducing the effective width of the subway.

Precast continuous slab

Two bridges which typify a precast slab continuous over but not attached to a center support are located at St. George, Ont. (Figs. 1 and 6) and Fergus, Ont. (Fig. 4). Both bridges are single-track structures with total slab lengths of 58 ft. 10 in. The decks are 30 in. thick and consist of two precast reinforced flat slabs placed side by side. Each of the two slabs (on each bridge) is 6½ ft. wide and independent of the other. One track rail is carried on each slab, on a creosoted oak cushion strip set in a groove formed in the top of the slab.

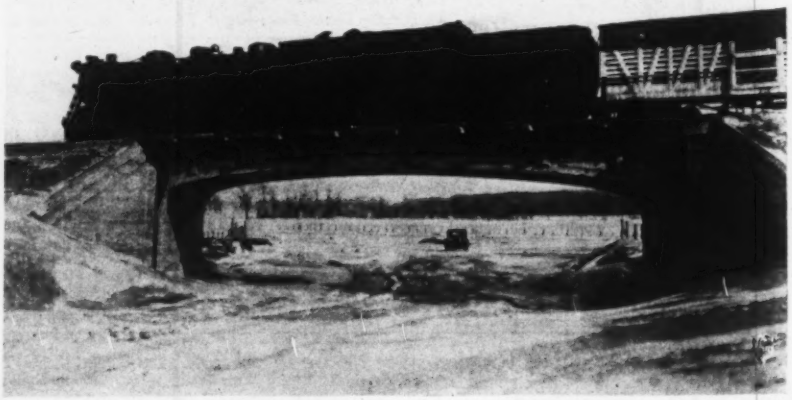
The joint between the slabs is of lap type, with the top half of one slab projecting 3 in. over the bottom half of the other. A ⅜-in. clearance is provided between the horizontal faces of the joint and a ½-in. opening between the vertical faces in the top half of the joint. The horizontal joint is filled with a strip of sheet lead, forming a cushion bearing, while the vertical opening is filled with asphaltic mastic. On top of the slab over the joint, to insure watertightness, ⅛-in. lead strips 10 in. wide anchored in each slab are lapped over one another and soldered.

The slabs are reinforced for both tension and compression, with bars bent up over the center support to resist negative moment. Erection stresses are cared for by tension reinforcing carried continuously through the base of the slab from one end to the other; also old 56-lb. steel rails are placed about 2 ft. apart crosswise of the slabs, to distribute the loads laterally. High-carbon steel reinforcing is used, with a minimum ultimate strength of 80,000 lb. per sq.in. A number of the bars are continuous for the full length of the slabs, and the remainder of the reinforcing was shop-fabricated by spot-welding the bars into trusses, as outlined above.

The slabs were cast in special forms at track level as near the point of erection as possible. Reinforcing was hung from an overhead crane, eliminating the necessity for blocking beneath it. Each slab was cast in one continuous operation. Concrete was required to have an ultimate strength of 3,000 lb. per sq.in.

In erecting the slabs two 150-ton locomotive cranes were utilized. The falsework bents, which had been used to carry the tracks over the opening while the foundations for the new bridge were being built, were extended laterally on both sides, and the precast slabs

FIG. 7—LONGEST RAILROAD STRUCTURE of rigid-frame design, at Vaudreuil, Que., has a clear span of 72½ ft. A double-track structure, it was built half at a time to permit uninterrupted train service.



were moved to them temporarily before being set in final position. The slabs weighed 79 tons each. Special lifting stirrups cast into the slabs near the ends provided for attachment of the hooks from the locomotive cranes.

Erection of the slabs was done between trains. With the aid of the cranes the track and falsework were removed and the slabs raised from their supports and swung over into final position on the new abutments and center pier. At St. George, where the whole job was timed in detail, the work was completed in 2 hr. and 10 min. after the track was taken over.

Continuous rigid frame

The poured-in-place, reinforced-concrete, rigid-frame structure (type 5), continuous over a center pier but not attached to it, is exemplified by a double-track structure over St. Clair Ave. in Toronto (Fig. 4). The extreme length of slab along the track is 111 ft. 9 in., providing for a 100-ft. span between abutments, divided at the center by the pier, which is about 4 ft. thick at street level. The tracks on the bridge are on a 2½-deg. curve and a 0.5 per cent grade. The distance from base of rail to under side of the slab is 4 ft. 4 in. The C.N.R. engineers believe that this structure excels in appearance and economy any other grade-separation structure of comparable size that they have built.

Construction was simple and rapid. Placing the reinforcing steel required five days, and all concrete was placed in a continuous 72-hour pour. It is believed to be the only rigid-frame concrete structure continuous over but not fastened to a center support and, in the opinion of the C.N.A. engineers, it represents the upper limit in span length permissible without tying the slab to the center pier.

In contrast to the conventional rigid frames used in highway service, the abutments of this bridge are of mass design and not essentially different from gravity abutments used for simple spans or arches. They are merely modified slightly to make them integral with the deck slab.

Clear-span rigid frame

The poured-in-place rigid frame of single clear span has not been as widely used for railway loading as some others, but the Canadian National has recently completed one with a 72½-ft. clear span near Vaudreuil, Quebec, about 25 miles west of Montreal, which is notable for being the longest rigid-frame concrete railroad bridge yet built and also for several design details. Although this type of structure (Figs. 4 and 7) cannot be built under single-track traffic and in long spans does not provide as shallow a deck as one supported at the center on a pier, these are about the only limitations to its use. On the

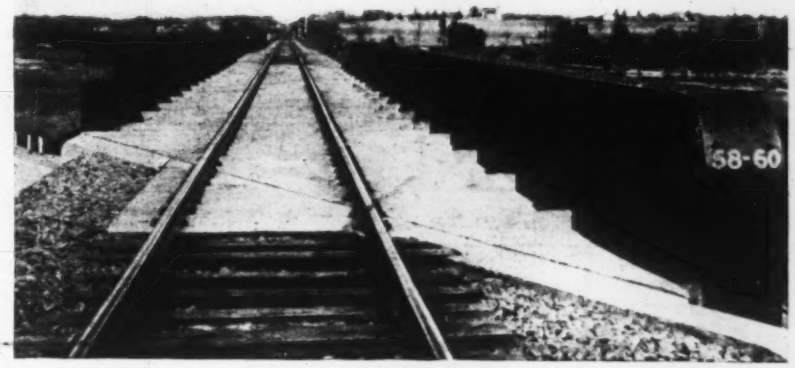


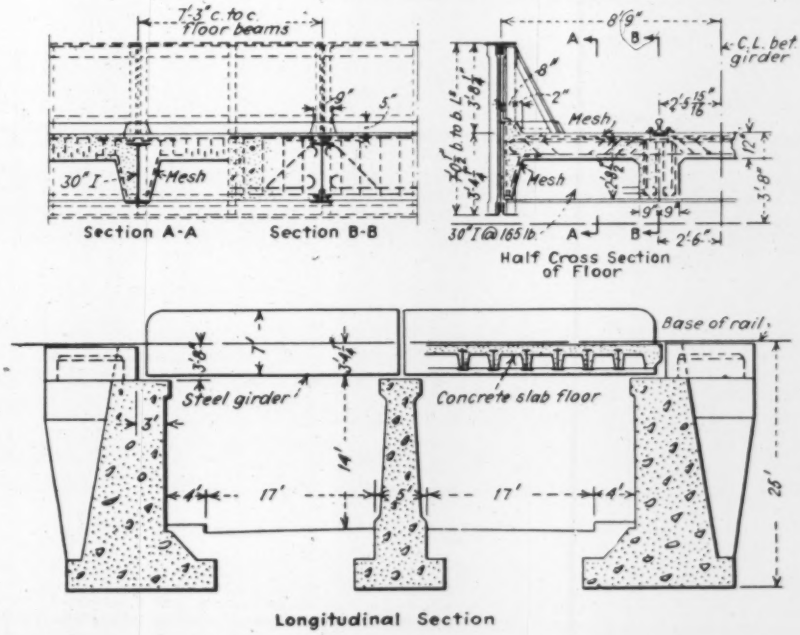
FIG. 8—DECK OF STRUCTURE at Breslau, Ont., involving a concrete slab but no steel stringers.

Vaudreuil Bridge a double-track line is accommodated, so that the structure could be built half at a time. The only connection between the two units is a sheet of strip lead placed horizontally in the joint to serve as a waterstop. The advantage of this two-unit construction is a considerable reduction in torsion stresses produced when heavy trains meet on the bridge traveling in opposite directions. The thickness of the slab at the center is 3 ft. 9 in. Careful studies and estimates of various types of structures for this location revealed that the rigid-frame design could be built at least 40 per cent cheaper than any other.

The bridge, which spans the main highway between Montreal and Ottawa, carries two tracks on a 1-deg. curve and crosses the highway at a skew of 57½ deg. It will be noted that the under side of the slab is arched for the sake of appearance, although the heavy fillets at the junction of the slab and abutments were required to avoid excessive stresses. The abutments of this bridge are actually extensions of the slab itself and stand vertically as slender walls as contrasted with the abutments on the St. Clair Ave. Bridge in Toronto, described above.

The footings for the Vaudreuil Bridge abutments are unique in several respects. The foundation material at the bridge is a clay, of good bearing capacity when dry but of quicksand consistency when wet. Consequently,

FIG. 9—COMBINATION steel and concrete structure at Breslau, Ont. Steel girders and cross-beams support a 12-in. concrete slab cast with T-beams under each rail.



creosoted timber piles were used. The piles were driven vertically, but cut off on a sloping plane at right angles to the resultant of all stresses throughout the structure. The pile cutoff was made 1 ft. below the elevation of the bottom of the footing, and the clay was excavated to a depth 1 ft. below the cutoff. A 2-ft. layer of crushed stone was then placed and tamped around the piles to a height of 1 ft. above the cutoff. On this stone mat the concrete footings were placed, the bottoms being sloped parallel to the pile cutoff.

The use of a stone fill between concrete foundations and the piles that support them is a new development adopted by the C.N.R. to secure bearing over the entire bottom area of the footings, it having been noted in demolishing bridges on pile foundations that the earth around the piles is seldom in contact with the footing. The use of a crushed-stone layer assures a definite full-sized bearing area. The practice is to drive as many piles as it is possible to get in, and then to fill between them with crushed stone.

Reinforcement of the deck slabs of the Vaudreuil Bridge consists of 1¼-in. square bars on 4-in. centers for tension at the center of the span and 1½-in. square bars on 4-in. centers for tension at the back face of the abutments. The inside faces of the abutments are reinforced with ¾-in. square bars spaced 8 in. apart, while the lateral reinforcement in the abutments and slab consists of ¾-in. bars spaced from 12 to 18 in. on centers. Stirrups are ½-in. square bars. Included in the reinforcing of the footings are eight lines of old 56-lb. rails and 1⅛-in. square rods on 8-in. centers transverse to the rails and hooked at the ends. The abutments are tied to the footings by 1-in. square rods 21 ft. long, bent in the shape of a U, with the loops placed near the bottom of the footing at a spacing of about 8 in.

The abutments are backfilled with rock for a distance of 15 to 20 ft., to eliminate lateral earth pressure against the structure and to insure efficient drainage. The wing walls of the bridge are of mass design, also on creosoted timber piles, but have no rigid connection with the bridge itself.

The Vaudreuil Bridge has been in service for about eight months on a double-track line that carries some of the heaviest and fastest traffic in America. At the time this structure was 28 days old it was subjected for a period of almost two months to temperatures well below zero. It has given perfect service, and the concrete (made with high-early-strength cement that was vibrated and placed in long continuous pours) has every appearance of being of excellent quality.

Novel steel design

The steel-plate girder bridge with concrete T-beam deck and no ties or ballast (type 7) is exemplified by a single-track structure at Breslau, Ont., 118 ft. long and on a skew of 25 deg. 20 min. (Figs. 8 and 9). The girders, 84 in. deep and spaced 17½ ft. c. to c., are supported on two abutments and a center pier. Floor beams of 30-in. rolled sections, spaced 7 ft. on centers, have their top flanges encased in a 12-in. concrete slab, which is cast with a T-beam under each rail location. No steel stringers are used, and no ballast or ties are required. The over-all depth of the floor is 2 ft. 10 in., and the distance from the top of the deck to the bottom of the girders is 3 ft. 4½ in.

In constructing this bridge the two spans were each built complete on falsework alongside their final position and then moved, in a period of 4 hours between trains, onto the abutments and the center pier, a system of steel rollers being used.

As a result of the development of the above seven types of grade-separation structures, a saving of 30 to 55 per cent is said to have been effected over the usual cost of such structures designed and built in the past. In addition, maintenance expenditures are entirely eliminated. The development outlined have been carried on in the Central Region of the Canadian National Railways under the general direction of C. B. Brown, chief engineer of the system, T. T. Irving, chief engineer of the Central Region, and W. A. Kingsland, general manager, C. P. Disney, bridge engineer, having been directly in charge of the design of all the structures.

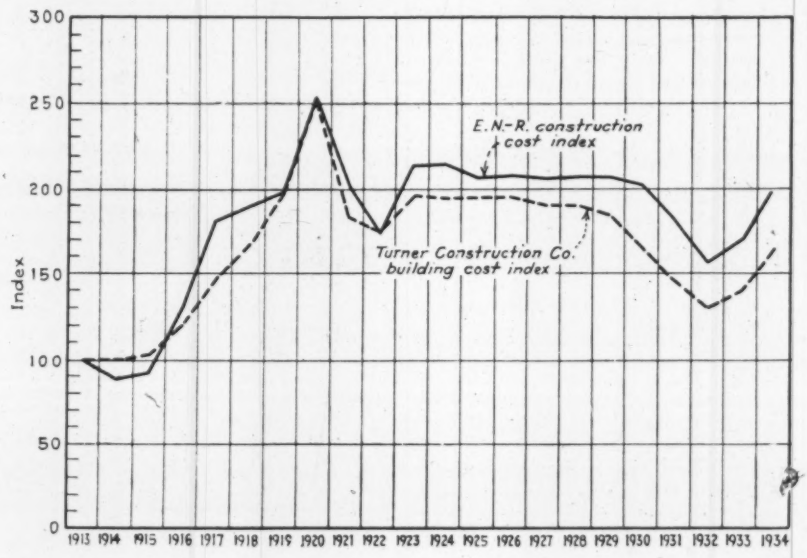
Comparison of ENR Cost Index with That of Turner Construction Co.

By H. H. Fox
Vice-President, Turner Construction Co., New York City

FROM 1913 to 1922 the construction-cost indexes of *Engineering News-Record* and the Turner Construction Co. followed each other fairly closely, except in 1917 and 1918. From 1922 to the present time, there has developed a gradually increasing divergence. This divergence, which is entirely natural and reasonable, results from the difference in the factors used in calculating the two indexes. The *ENR* index is based on the cost of three basic construction materials—cement, steel and lumber—and common construction wage rates. The Turner index goes further than this by including factors of the productivity of labor, improvements in construction plant and construction management, and competitive conditions—all as determined by actual cost records. Then, too, the Turner index is based almost wholly on costs of building construction, while the *ENR* index is based on the prime factors of costs of all classes of construction. One is a building-cost index; the other is a general construction-cost index.

A comparison of the two indexes from 1913 to 1922 (see accompanying chart) suggests that there was little

COMPARISON of the *ENR* cost index of general construction with the Turner Construction Co. building-cost index, in yearly averages.



improvement in either construction plant or the productivity of labor during that period. From 1919 to 1922, total construction volume was fairly constant at about $4,000,000,000 per year. From 1922 to 1928 there was a rapid increase in volume, from $4,900,000,000 to $10,500,000,000. Wages rose rapidly, and it became necessary, not only in order to handle this large volume economically but to handle it at all, to introduce and improve machinery wherever possible.

During this period of rapidly increasing volume, the Turner index was less than the *ENR* index by an amount varying from 5 to 10 per cent. Since both contractors and labor were all employed, the factors of productivity of labor (except as affected by improved machinery) and competitive conditions did not operate to any marked extent. However, when volume began to decrease in 1929 and continued to decrease in the subsequent years and it became possible to weed out the less efficient workmen, the higher daily production of labor and the scaling down of profits had a decided effect, with the result that for the last four years the values of the Turner index have averaged about 18 per cent less than the values of the *Engineering News-Record* index.

Concrete-Placing Details at Boulder Dam

MASS PRODUCTION does not becloud careful detail in placing concrete at Boulder Dam, as the accompanying illustrations strikingly testify. As soon as the 8-cu.yd. bucket has placed its load along the edges of a columnar block, the whining hum of several vibrators provides an accompaniment to which the batch is worked down into the corners and up against the forms. The mix is placed dry enough so that workmen walking through it immediately after it is dumped find short rubber boots adequate, but the vibrators and tramping workmen with spades soon flow it into every corner of the forms. The concrete mix, which was described in our issue of Dec. 21, 1933, p. 740, does not require vibration throughout the mass, but the vibrators are used around the edges of the blocks.

After a pour has been finished and forms are set up for the next lift, there is still one additional touch before the "working" of the concrete is finally completed.

This job is accomplished with a combined air and water jet that has been popular on western jobs for many years—a combination of two such widely different specific gravities that when the jet strikes the surface the result is an impact much more effective than could be obtained with jets of either air or water used separately.

However, the refinement of note in the use of this jet on the Boulder job is in careful control of the *time* of its application. It is not regarded as sufficient to hose off the surface at any convenient time prior to pouring the next lift.

The ordinary requirement is that the jetting must be done at just that stage in the curing process when the concrete has hardened to such an extent that a certain small percentage of the surface will be loosened and cut away by the jetting, thus giving a maximum cleaning effect and leaving a sharply broken surface that is ideal for effective bonding.

Bonds made with this procedure and tested in shear at the University of California laboratory averaged 92 per cent of the strength of the concrete itself.

VIBRATORS and air-water jets are essential devices in placing the concrete for Boulder Dam.

Construction in the West

—*From an Editor's Notebook*

Great engineering works under construction west of the Rockies are a symbol of new expansion—Their effect on recovery is doubtful, but they are inspiring—Fundamental economy and policy questions remain to be answered

San Francisco, June 23, 1934

WHEN the westward traveler of these days crosses the Divide he comes into a region of unprecedented and bewildering construction activity. There is nothing like it in the East. Probably nothing like it has ever been recorded in history. From Fort Peck south to Boulder Dam, from the Colorado River Aqueduct tunnels to the San Francisco bridges and the Columbia power plants, a series of stupendous works is under construction, grand in dimensions and grand in conception. At the present moment the East has nothing to give scale to them except the slowly evolving Tennessee Valley experiment, with its two dams and its ambitious plans for combining regional power supply with industrial and agricultural rehabilitation.

These works moreover are distinguished by the high excellence of the engineering applied to their technical problems. Planning is scientifically precise and thorough, construction is machinelike in its perfection. At the same time they are complicated by difficult, unsolved questions of economics and public policy, which already have been the subject of much discussion. Since the nation is paying the major part of the construction bill, everyone is concerned in these questions.

Work under way

The list of active works includes the 230-ft. earth dam across the Missouri River at Fort Peck, Mont.; the Seminoe dam for North Platte River storage in Wyoming; the Alcova irrigation project some miles below; Grand Coulee and Bonneville Dams on the Columbia; the two huge bridges now rising in San Francisco; the 240-mile aqueduct which southern California is building to obtain Colorado River water; the All-American Canal, one of the most difficult water channels ever undertaken; and of course Boulder Dam, already up to more than half its 725-ft. height. A dozen or two reclamation dams and canals are begun or are soon to be started, and two rockfill dams for flood control are under construction in San Gabriel Canyon near Los Angeles.

Various other undertakings might be added to this list, including bridges, soil-erosion works and the like. Even without these, however, the great enterprises mentioned represent a construction investment of roughly three-quarter of a billion dollars. Since all of this investment is in productive works, the big question is how much of it will pay, and how the process of trying to make it pay will affect the people of the West and their business activities.

Except for the San Francisco bridges, the Metropolitan Water District Aqueduct and the San Gabriel dams, the projects are undertakings of the federal government. Many of them are part of the recovery campaign, made possible by last summer's Recovery Act—Fort Peck, Seminoe-Alcova, Grand Coulee and Bonneville, together with the group of minor reclamation projects. Thus, fully a quarter of a billion dollars of construction capital has been poured into this western region within the past year. Indirectly, much more should be counted in the recovery column, for both the Bay Bridge and the Colorado River Aqueduct are financed by RFC money. On the other hand, Boulder Dam and the All-American Canal have no relation to recovery stimulation, for they were started long before this campaign began, and they are operating on PWA money only because they were robbed of their congressional appropriations last year, after which PWA money was diverted from the $3,300,000,000 fund to keep them going.

Inevitably one asks what the huge projects have done for recovery. The simple answer is, very little; they have put few men to work. In all probability they retarded it by standing in the way of projects that could be built more quickly. For instance, Oregon and Washington have received barely a small handful of PWA loans, because so much money was allocated to Grand Coulee and Bonneville. These two big projects employ a few hundred men, the small projects a few hundred more; that is all that the PWA has done for the two states in the time of the greatest unemployment need ever known. Such is the result of the politics and PWA mismanagement that diverted so large a part of the three billions to large, slow-moving federal undertakings. The senators who grabbed off Grand Coulee and Bonneville from the political plum-tree may later on find out in votes that they did their states poor service.

Expansion and water shortage

Seen as a whole, the big works in the West are symbols and agents of new expansion. The West is growing through their construction and is preparing for the further growth that is sure to come about through their influence. This is something to animate one with new spirit, for we have been hearing during three years that the country's days of expansion are at an end, that the frontier is gone and that we must settle down to mere operating. That we still have a long time of further expansion ahead is proved by many current facts which show that our resources are inefficiently and incompletely utilized.

Most profoundly is this true of water. The present year is one of water shortage in the West, paralleling the great springtime drought of the Middle West and Plains regions. Reservoirs are low everywhere. Streamflow is abnormally small. Pathfinder Reservoir, principal storage place of North Platte water, should be full in early June; yet at that time it was only one-third full and nevertheless had to send downstream 2,500 sec.-ft. for irrigation supply though only one-third as much was flowing in. The Columbia, now flowing 300,000 sec.-ft., is at a record low for the time of year. The Colorado's flood peak this year was only 25,000 sec.-ft., very little above its mean annual flow; the flood peaks of the preceding years reached 80,000, and the diversion tunnels were built to carry a flood of 200,000 sec.-ft.

In view of these alarming conditions it is natural and fitting that water should occupy a dominating position in most of the current great works. In fact they mark out a new and critically important campaign of water conservation on a large scale. They suggest also that it is time for the East to think more seriously of its water resources.

Water conservation

After one comes through the drought regions and notes the widespread shortage in rainfall and the havoc that it has caused, one cannot escape the conclusion that water conservation is vital in every part of the country. In the humid half of the country, the fact that without water there can be no life—everyday knowledge in the West—is rarely thought of. Conservation of water and broadly efficient use of both stream and underground waters have therefore not had much attention east of the Missouri. But the narrowing margin of stream resources in the East coupled with the experiences of the 1930 drought and that of the current year indicates that the Eastern problem is not essentially different from that of empty reservoirs in the West or falling groundwater levels in the Plains area

and in the central and southern California regions.

Western water-development studies therefore are centering on complete equitable utilization of the available supplies. The essence of the Boulder Dam project is regulation of the Colorado, all-important stream of the intermountain basin, so as to make its full flow available when needed, regardless of low years and even low cycles. The group of reclamation works included in the recovery allocations is planned to relieve shortages of water that can be corrected only by impounding all the remaining flow in costly new storage reservoirs and making it available in the growing season. The American Falls Reservoir on the Snake River in Idaho, when planned and built eight or ten years ago, was believed, on the best water knowledge then available, to assure a fully adequate supply for irrigation in even the driest years; yet the supply has been short in a majority of the years since the reservoir was finished, and new reservoir sites are now being sought to save the remaining floodwater runoff.

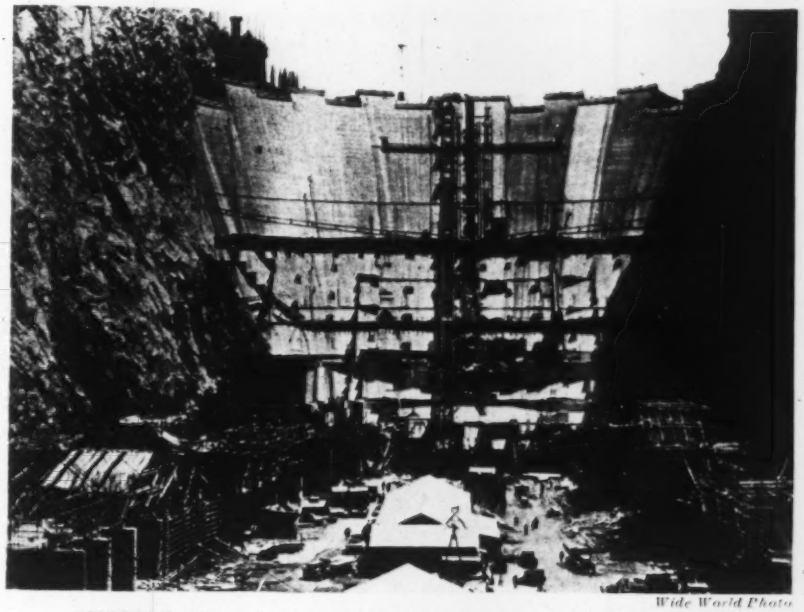
The fact seems to be that an abnormally low period in the water cycle has set in throughout the West, and at present no one knows whether this period is beginning, is ending or has some time yet to run. If a still lower level is ahead, the results would be so serious as to justify every effort to develop streams to full capacity, even at a cost that ordinarily would be prohibitive. This is the condition that explains many of the high-cost storage undertakings, and that at the same time gives rise to difficult problems of accounting as between cost and benefits.

Alcova and economic questions

In the effort to attain 100 per cent stream utilization, the North Platte River presents a leading case. It is interesting just now because of the Alcova project, which has been much discussed as to its economic soundness.

That project was first studied about 30 years ago, soon after the Reclamation Act was passed, and on repeated investigation was rejected as economically impossible because of its high cost and the small chance of developing a sufficiently remunerative agriculture; it is located far from markets, it is at high altitude (nearly 6,000 ft.), and much of the soil is poor. At that time the irrigation of some 200,000 acres was in contemplation; this area has now been reduced by two-thirds through careful restudy of the soil and exclusion of all questionable land.

In the early days, also, the state authorities granted a permit for building the Pathfinder Reservoir on the understanding that an irrigation project would be located in Wyoming. But when the Casper-Alcova area was condemned as unsuitable, the water was applied to Nebraska lands far down the river—the North Platte project, only a very small part of which extends up into Wyoming. The obligation of the federal government to utilize some North Platte water for developing an irrigation project in Wyoming was considered to remain.



Wide World Photo

BOULDER DAM, one of the great engineering works now under construction west of the Rockies, already is up more than half its 725-ft. height.

In the meantime new conditions developed. First, the city of Casper, which once flourished on oil refining, declined with the oil fields and became more dependent on its stock ranges, which for efficient and safe operation need an agricultural area to supply them. Second, the water storage at Pathfinder became inadequate for the Nebraska lands themselves; even after construction of the supplementary Guernsey Reservoir, the irrigators there have found it difficult to get enough water. The additional headwater storage to save the remaining floodwaters can be made adequate to supply some Wyoming land. Third, power became important, and the prospect of developing power at the upstream storage changed the economic picture.

The Casper-Alcova project planned in response to these conditions and authorized last year by the PWA (without having been considered by Congress), is estimated according to the latest figures to cost $14,300,000 for diversion dam, canal and drainage system. This sum, applied to 66,000 acres, means a cost of $217 per acre, which is two or three times as much as any other irrigation project has been able to repay. Thus the project looks impossible. But the Seminoe power dam and transmission line, to cost $8,400,000 and to produce some 18,000 kw. firm power, is expected to yield enough profit to repay not only its own cost but also more than half the cost of the Alcova irrigation project. Applying the anticipated profits, the capital charge on the irrigators is reduced to $80 per acre, which amount (say the agricultural experts) can be repaid from the agricultural yield.

Viewed as an irrigation and power development then, the enterprise appears to combine a sound and profitable power project with an unprofitable irrigation project, one that is bankrupt from the start. The people of the region, however, regard the irrigation project as the more important, believing that their economic future depends on it. They have an argument on their side. Development of the irrigation area will bring tangible money benefit to many others besides the farmers themselves—to the inhabitants of the city, to stock interests and others for many miles around, to the state as a whole, and in some measure to manufacturers and merchants far away in the industrial centers, whose market will be increased by the new development.

It is difficult to assess and collect these benefits, but they do exist. A true economic balance sheet of the enterprise, with all costs set down on one side and all benefits on the other, regardless of whether they are directly paid for or not, would be an interesting and valuable document. Probably the general social benefit to Wyoming and to the country at large through the development of a self-sustaining community of homes and through increases of total business should be included in such an accounting. But no one has yet been able to produce this balance sheet.

There appear to be no figures that throw light on the ultimate question of

economic soundness. Whenever irrigation economics is discussed, one hears either the bare facts as to first cost and ability of the farmer to repay, or else a lot of glittering generalities about making the desert bloom and creating untold millions of wealth. Neither line of argument answers the question conclusively. There is urgent need for searching economic analysis.

Economic questions of the same kind crowd about many of the Western projects. In most cases there is no definite answer to the question of whether they can pay—and if so, when. Yet it is only fair to ask whether they are needed now if they cannot show black ink for many years to come. Most strikingly such questions affect certain projects that have not yet been begun, like the Central Valley water project in California or the Columbia Basin irrigation project. But they also affect Bonneville, Grand Coulee and Fort Peck.

What value is to be placed on the Missouri River flow regulation at Fort Peck? What is to become of the large blocks of power to be generated at Bonneville and Grand Coulee? Even the most hopeful people do not believe that a large fraction of the Columbia River power will find a market in less than a quarter of a century, and it is hardly necessary to say that a commercial enterprise whose returns are so long deferred would be unsound busines. Here also economic study is in order distinguish the legitimate public val from merely political value.

To summarize early impressions: T magnitude of these new great works the West, their bold and picturesq character, the high quality of technic achievement which they embody, mak them a marvel and an inspiration. R gardless of their small effect on r covery employment, and regardless any doubts as to economic justificatio they claim an extraordinarily high pos tion as the most remarkable group public improvement undertakings ev attempted in this country, and probabl in the world. F. E. S.

Slump-Honeycomb Relationship in Paving Concrete

Tests indicate that increased honeycomb due to low-slump concrete with ordinary machine finishing cancels theoretical advantage of low water-cement ratio

By F. H. Jackson
Senior Engineer of Tests, Bureau of Public Roads, Washington, D. C.

IN INTERPRETING the results of tests of small concrete specimens made in the field during construction, it is quite common to assume not only that the results measure with reasonable degree of accuracy the actual strength of the concrete in the structure, but also that variations in strength will indicate corresponding variations in the strength of the concrete in the structure. This observation applies with special force to the interpretation usually placed upon changes in strength due to changes in the water-cement ratio.

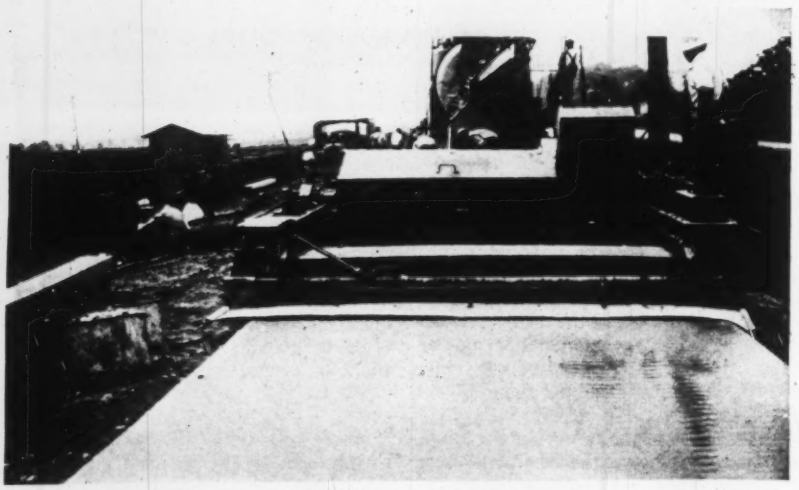
Take, for example, the field tests for flexural strength of pavement concrete. It is assumed, simply because a series of control beams show that flexural strength is increased as the water-cement ratio is decreased, that the strength of the concrete in the pavement must necessarily vary in the same direction and by the same amount. No consideration is given to the fact that the fundamental water-cement-ratio strength relation applies only to concretes that are "workable" and that the limit of workability may be quite different in a pavement as compared to a small test beam. This, of course, is due to the fact that the workability of any given concrete depends upon the type of structure in which it is used and the method of placing, as well as the physical characteristics of the concrete. For this reason, laboratory tests for consistency, such as slump or flow, are of no value as measuring workability unless the results of such tests have been correlated with the quality of the finished product.

The ability to secure a homogeneous, uniform concrete with the method of placing in use is, after all, the real test for workability. However, having once ascertained the range in slump or flow that will produce the most uniform concrete as determined through a careful analysis of the completed structure, there is no reason why this information cannot be used to control the consistency of any similar concrete to be used under the same conditions.

In 1931 the Bureau of Public Roads published a report (*Public Roads*, August, 1931) discussing the results of a series of tests, which developed valuable information along this line. An actual pavement about one-half mile in length and 9 ft. in width was constructed in the usual way—that is, using standard full-size construction equipment. Each of the 260 sections, 9 ft. long, was subsequently taken up and tested to determine the actual flexural strength of the pavement slab. The extent and distribution of honeycomb in the bottom of each test slab were also determined for use as a measure of the uniformity of placement. These data were correlated with the results of slump tests made on the concrete as it was going into the work and also with the results of tests on beams and cylinders cast alongside the pavement.

Subsequent to the publication of this report another series of tests was conducted which furnished additional data along the same lines. These tests were reported in *Public Roads*, October, 1933.

FIG. 1—SURFACE FINISH secured on test road pavement indicates results generally accepted as satisfactory in well-supervised actual paving operations.



Information secured from these tests regarding the relation between consistency and workability led to a recommendation by the Bureau of Public Roads in 1931 that the consistency of all pavement concrete involving the use of normally graded aggregates be controlled so as to give a slump ranging from 2 to 3 in.

The original report, published in 1931, did not emphasize this relationship, as the study was initiated primarily to investigate the effect of other variables. It is felt that there may be a number of engineers who have not as yet been convinced of the soundness of this particular recommendation. Therefore, in order to present the matter clearly and entirely apart from any other conclusions, the data reported in the August, 1931, issue of *Public Roads* have been re-analyzed and the results discussed in this paper in considerably more detail than in the original report.

The primary purpose of the tests was to study the behavior of harsh mixes—that is, those carrying more than the normal amount of coarse aggregate. Such mixtures as 1:2:4½ and 1:2:5 are of course not typical of present-day practice. Results obtained with these harsh mixtures have therefore been omitted from the present study in order that the trends observed may be assumed to be typical of the results actually being secured at this time in the field. This confines the discussion to the 1:2:3½ and 1:2:4 proportions, dry-rodded, using as coarse aggregate both gravel and coarse stone conforming to two gradations, a total of 96 test sections. Full details concerning the physical characteristics of the aggregates, grading, voids, etc., are given in the complete report.

Plan of analysis

It goes without saying that segregation during placing should be avoided as much as possible. Honeycomb areas are sources of potential weakness for which no provision is made in the design of a pavement slab. Furthermore, the mere fact that the surface of the slab can be finished without difficulty is no indication that the concrete on the bottom is free from honeycomb. Practically all of the test slabs included in these tests were satisfactorily finished after three passes of a standard finishing machine. The type of finish secured is shown in Fig. 1. The character of honeycombing encountered with the dry concrete is shown in Fig. 2.

In order to show directly the effect of the consistency of the concrete on workability, as revealed by the amount of honeycomb in the pavement slabs, the average percentages of honeycomb in all the 1:2:3½ and 1:2:4 sections containing concrete of a given slump have been plotted as indicated in Fig. 3. It will be seen at once that there is quite a definite relation, the amount of honeycombing rising sharply as the slump is reduced. This curve shows very definitely that, to reduce honeycomb to less than 1 per cent, it is necessary to use a slump of 2 in. or more. Dividing the sections into three groups on the basis of consistency, the weighted average percentage of honeycomb in all slabs having a range in slump of ¼ in. to 1 in. is about 5½ per cent; for the 1¼- to 1¾-in. range, about 2 per cent; and for the 2- to 3-in. range, about 0.3 per cent.

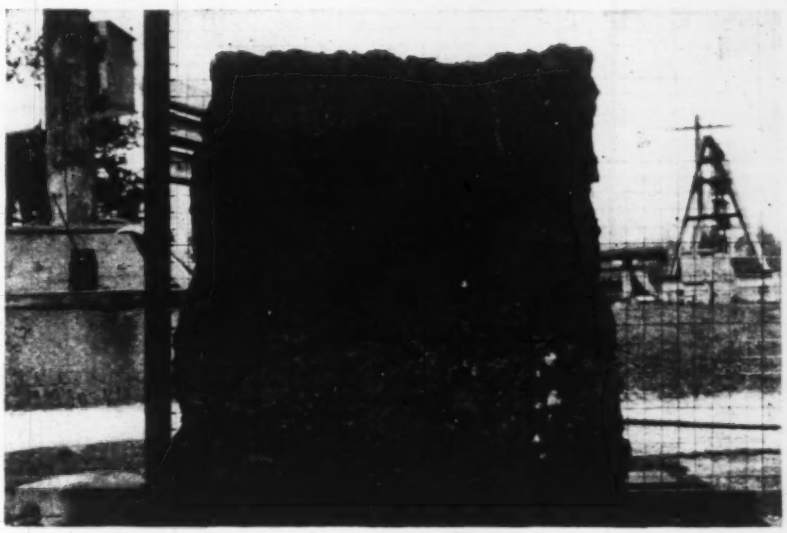


FIG. 2—MEASURING HONEYCOMB in bottom of paving slab by means of wire-mesh checkerboard.

In order to show the effect of this honeycombing on strength, the results of both pavement and control tests for strength have been averaged for each of the three ranges in slump indicated above and for each type of coarse aggregate. The average results of the flexure tests are shown in the lower portion of Fig. 4, and the results of compression tests on cores as compared to standard 6x12-in. cylinders are shown in the upper portion.

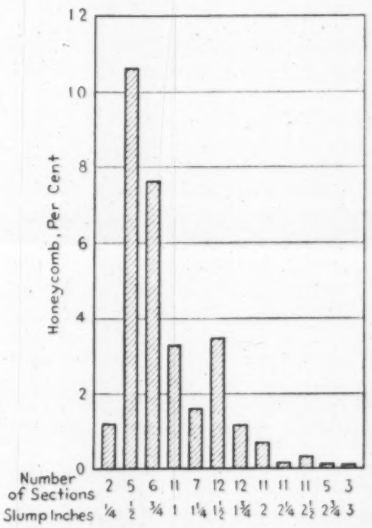


FIG. 3—SLUMP-HONEYCOMB relationship as disclosed by pavement slabs.

Flexure tests

In the case of both the 1:2:3½ and the 1:2:4 mixes it will be noted that, for the groups of sections in which the slump averaged from ¼ to 1 in., the average strengths of the pavement slabs are lower than the corresponding beam strengths. On the other hand, for the groups of sections in which the slump varied from 2 to 3 in., the average beam strengths with one exception are lower than the pavement-slab strengths. Furthermore, for the range in slump studied, the slab strengths increased consistently with increase in slump in spite of the fact that the water-cement ratios were also increased. On the other hand, the molded beams decreased in strength with increase in slump and water-cement ratio. It is felt that the increase in slab strength is due largely to the fact that, as shown in Fig. 3, the drier sections were honeycombed to a greater extent than the sections containing the 2- to 3-in. slump concrete. The average percentage of honeycomb for each group of test slabs is shown in the figures. The molded beams were, of course, fabricated under standardized laboratory procedure. These specimens were, in general, free from honeycomb, indicating that under this method of placing all of the concrete could be rated as workable. Consequently, the strength of the beams decreased with increase in water-cement ratio and slump, as would normally be expected.

These tests show that the maximum strength of the pavement slabs for the range in consistency studied (that is, 0 to 3 in.) was not attained until a slump of at least 2 in. was used. It is true that the actual differences in terms of pounds per square inch are not

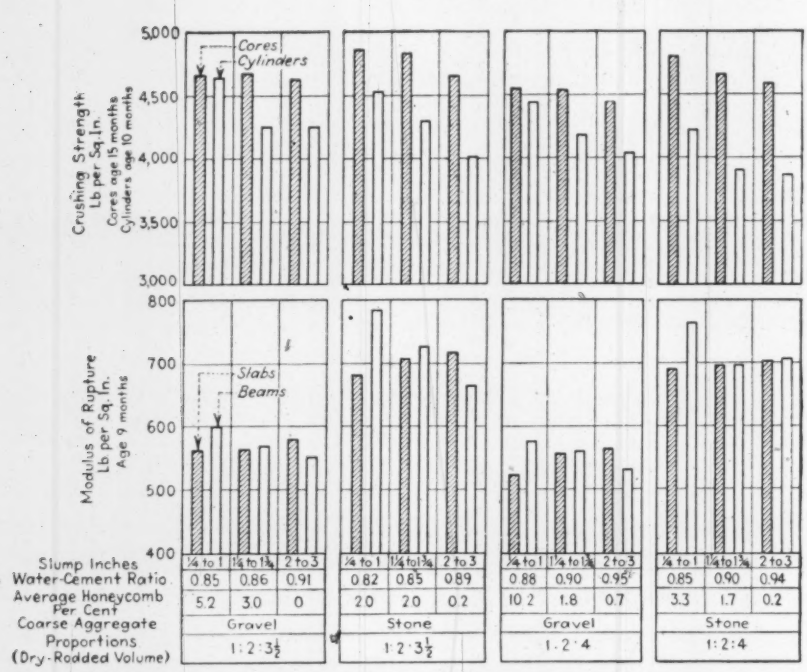


FIG. 4—CONSISTENCY AND STRENGTH RELATIONSHIP of paving concrete as disclosed by crushing strength of cores and cylinders and modulus of rupture of beams and slabs.

great. The important point is that the strengths did actually tend to increase with increase in water content in spite of the opposite trend indicated by the control beams. These tests illustrate quite clearly the danger of assuming that, because higher strengths are obtained in the control beams by reducing the water-cement ratio, a similar improvement will be obtained in the pavement. On the contrary, we actually secured not only more uniform concrete (that is, less honeycombing), but also concrete of higher average flexural strength when the 2- to 3-in. range in slump was used.

Of course this does not mean that the strengths would continue to rise with further increase in the slump. On the contrary, there is every reason to believe that, having once secured a condition where the concrete may be assumed to be workable (that is, 2- to 3-in. slump), further additions of water would tend to lower the slab strength as well as the strength of the control beams in accordance with the water-cement-ratio strength law. It should be emphasized that there is nothing in these tests to discredit in any way this basic relation. On the contrary, the tests verify the principle in that they demonstrate very definitely the necessity of limiting its application to consistencies that are truly workable.

Compressive tests

A discussion of the average crushing-strength results shown in the upper portion of Fig. 4 is also of interest in revealing the extent to which these tests indicate relative pavement quality. It will be seen that both average core and average cylinder strengths decreased with increase in slump and water-cement ratio, thus paralleling the trend indicated for the beams but opposite to the trend shown for the large slabs. The cores show higher strengths than the cylinders. This, however, is not necessarily significant, due to the fact that the cores were five months older than the cylinders when tested.

When drilling the pavement cores, an effort was made to avoid honeycomb areas so that the crushing strength of these specimens really represents the strength of only the homogeneous portion of each section. This, in the writer's opinion, accounts for the fact that the core strengths tend to follow the trend of the cylinders and beams rather than the full-size slabs. Had it been possible to make compression tests of specimens of a size that would include the honeycomb areas in their proper proportion to the whole, a trend paralleling the slabs would probably have been obtained. This was obviously impractical in a compression test.

A core specimen is in reality a random sample not necessarily representative of the pavement as a whole unless a very large number of them are taken. For this reason, the justification for assuming that the results of core tests are significant depends largely on the uniformity of the concrete. The compressive strengths of cores taken from 2- to 3-in. slump concrete are entitled to more consideration than those drilled from drier concretes because they are taken from a more uniform and homogeneous slab and consequently represent more nearly the average crushing strength of the concrete. Cores taken from the drier, less-uniform concrete would on this account probably show less uniformity, the results, as in these tests, being high when the cores are drilled from non-honeycomb areas and low when drilled through marked honeycomb areas.

A study of the two concrete mixes employed in these tests in the light of the detailed data regarding grading, voids, unit weights, etc., of the constituent materials shows that there was nothing freakish or unusual about them. The construction practices were identical with those used in the field with the exception of the separators installed to create longitudinal planes of weakness. A study of this detail during the second series of tests showed clearly that these separators did not interfere in any way with the normal distribution of the concrete on the subgrade. It seems safe to believe, therefore, that when concretes having less than 2-in. slump are used, the same tendency to segregate takes place in the field as in these tests. It also seems safe to assume that this can be overcome by using 2- to 3-in. slump concrete, without lowering the flexural strength of the pavement, and it has been shown that strength is actually increased.

It is felt that these observations assume considerable practical significance in the light of the drive for dry concrete which followed the publication of the water-cement-ratio strength law by Abrams in 1918. This drive was so effective in the field of pavement concrete that many states revised their specifications to require ¼-in. to 1-in. slump concrete. Although these requirements were subsequently modified in most cases, the average specification still calls for less than 2-in. slump concrete. It is hoped that this discussion will throw some light on the reasons for the recommendation of the bureau that 2- to 3-in. slump concrete be used in all concrete pavements constructed by the methods now in common use.

Indiana Road-Oiling Program

More than 3,500,000 gal. of oil are being applied to 725 miles of Indiana state highways. This is the most extensive oiling program ever undertaken by the commission, to give the state a dustless system. The work will be in progress about 30 days. The commission has sent to all newspapers of the state a bulletin indicating all of the roads to be oiled, suggesting that their readers be notified so as to avoid inconvenience on the gravel and stone-surfaced roads. The mileages of the various districts are as follows: Crawfordsville, 170; Greenfield, 54; Vincennes, 146; Seymour (a), 90; Seymour (b), 84; Fort Wayne, 87; LaPorte, 93 miles.

Some Basic Principles of Grain-Elevator Design

Foundations, bin arrangements, working-house size and shape must be selected on basis of economy both of construction and operation—Different requirements for terminal layouts and country elevators

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Consulting Engineer, Melbourne, Australia

THE DESIGN of grain elevators and appurtenant works would appear to follow a much more standardized pattern than is the case for many other types of engineering structures. Only in general, however, is this true, and while the experienced elevator designer has little difficulty in deciding upon the correct layout for an elevator of predetermined size and number of bins, he, nevertheless, can seldom use identical structures for two different locations. Even when grain requirements and the need for economy in materials and labor permit the duplication of an elevator, such items as foundations and often access conditions are generally different. This article considers some of the basic principles of concrete grain-elevator design which may be generally applicable and in addition discusses typical designs of such elements as foundations, bins, tunnels, pits and working-house storage facilities. Experiences and structures in North and South America and in Australia have been drawn upon in the preparation of the material.

All elevator foundations have certain features in common. Of the loads transmitted to the substructure there is a large and definite live load due to the grain, which may be as high as 75 per cent of the total load of a main storage building, and is generally from 25 to 50 per cent of the total load in a working-house. These loads can be accurately determined, whereas the foundation loads for bridges and office or warehouse buildings are usually dependent upon coincidences. A further feature of elevator foundations is their invariable proximity to railway tracks, which exposes them to vibration; in the case of large terminals such vibrations may be unimportant, but for a small country elevator they are often a serious consideration. Ground that is suitable for growing grain can generally take the foundation pressures from country elevators directly, while the ground along waterfronts, where terminal elevators are likely to be found, usually requires piles.

Elevator foundation design is largely dependent upon the method chosen for providing for the conveyors beneath the bins. The elevator may have a full basement, as shown in Fig. 1, or else a single tunnel, as shown in Fig. 2. The full basement is used extensively for terminal and mill elevators where the space beneath the bins is required for storage of sacks or for subdivision into offices. The floor of this basement forms a foundation slab, which may either transfer the loads directly to the ground or distribute them to piles. The full basement is generally adopted for pile foundations.

The second method, involving a tunnel under the bins, is commonly used for country elevators where the full basement would mean waste space and unnecessary height. This scheme will prove most economical where a double row of bins discharges to a single conveyor. Fig. 3 shows an intermediate method that may be adopted where the bins discharge to more than one conveyor and the full basement is not required. In the schemes shown by Figs. 1 and 3 the headroom in the basement may be decreased by setting the conveyors in channels in the floor, as shown in Fig. 4. The designer should have no difficulty in deciding which of the above schemes is most suitable for his requirements, and should then modify it to conform with local conditions.

Where the ground is capable of taking high pressures, the walls and columns under the bins may transmit their pressures to the ground through footings. This method may also be adopted for pile foundations, where it is desired to group the piles, the footings serving as pile caps. The basement can then be a thin floor slab, as shown in Fig. 5. The ring footing shown in Fig. 6 is particularly applicable to the foundations of elevators where the bin wall comes down to the ground. Although such footings can be used with pile foundations, they will generally be found to be most economical for elevators on hard soil. Ring footings should be independent of the tunnel, and hence should be capable of taking the entire load from the bin wall. Thus the bin wall should span across the top slab of the tunnel and

FIGS. 1-4—VARIOUS foundation layouts as affected by conveyor installations and tunnel arrangements.

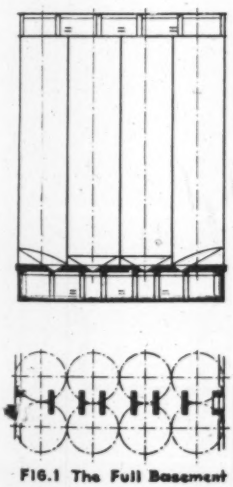


FIG. 1 The Full Basement

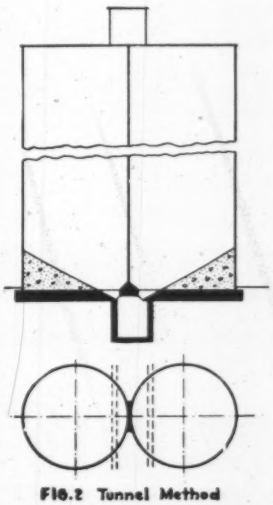


FIG. 2 Tunnel Method

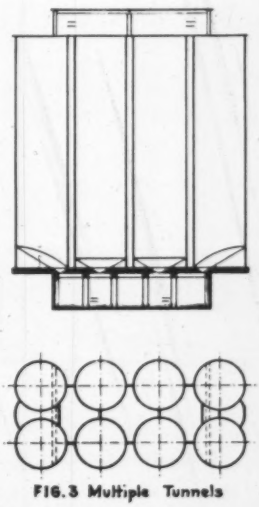


FIG. 3 Multiple Tunnels

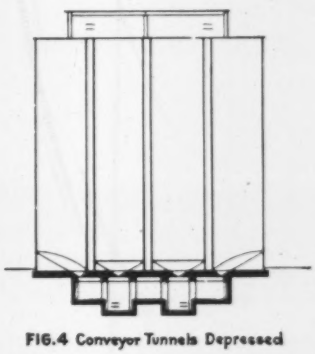


FIG. 4 Conveyor Tunnels Depressed

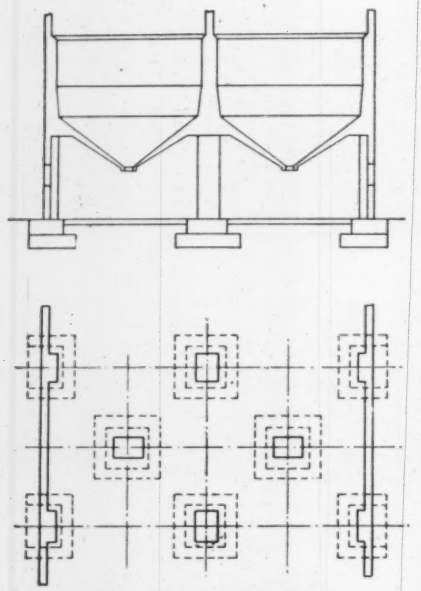


FIG. 5 Individual Footings

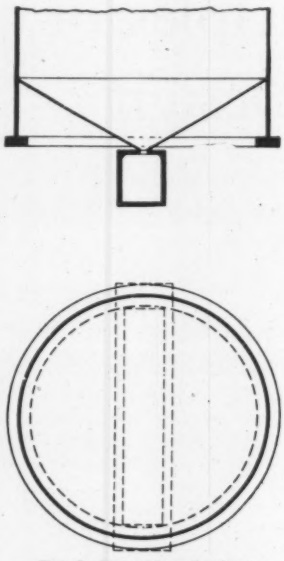


FIG. 6 The Ring Footing

FIGS. 5 and 6—TYPICAL FOUNDATION designs for elevators and solid-ground locations.

transmit its load to the footing on either side; it should be noted that a special beam is shown across the top slab of the tunnel in Fig. 6.

Tunnel under the bins

The tunnel housing the conveyors under the bins may or may not be connected to the bin-wall foundation. Fig. 2 shows the tunnel and foundation slab connected, while Fig. 6 shows them independent of one another. Where the ring footing can be used, as in Fig. 6, it is generally unnecessary for the tunnel to assist in transmitting the bin-wall loads to the ground. However, where the ground is such that a foundation slab is required, the area occupied by the tunnel becomes important, and the tunnel floor slab must be capable of taking its share of the bin loads. This necessitates strengthening the tunnel walls and floor slab beyond the dimensions theoretically required for conveyor housing or for watertightness.

Trouble often develops at the connection between the tunnel and foundation slab, cracks appearing not only in the tunnel but also at the top and bottom of the outside bin walls. As a result, some builders look upon this type of elevator foundation as inherently wrong, but the fault is in the details and not in the type. Often the cause of the cracks is greater settlement of the main slab than of the tunnel bottom, and to resist such a tendency the haunches at the connections (Fig. 2) will be found effective.

Another requirement is that the top slab of the tunnel should have strength greater than is theoretically dictated by the vertical grain pressures, because if this central part is flexible there is a danger that the portions of the main slab on either side of the tunnel will settle differently. This may directly result in the formation of horizontal cracks at the bottom of the bin wall, or else the sinking side may transmit a pull through the roof slab. These dangers can generally be eliminated by the use of additional vertical steel in the outside bin walls and by properly extending this steel into the top and bottom slabs. In the case of tunnel walls an endeavor should be made to design them as beams standing between cross-walls or pilasters, or between the top and bottom slabs, since the bending moment then will be less than if the walls are designed as cantilevers supported at the bottom.

Grain-reception pits, the same as tunnels, comprise an integral part of the foundation. For country elevators, reception pits with hoppers may be classified into two types: those in which the grain from the wagons passes from where it is tipped to the elevator leg by gravity, and those in which it is mechanically conveyed. Fig. 7 shows an example of the former type, suitable for receiving grain from one line of wagons. These hoppers should be capable of holding one wagonload of from 3 to 5 tons, and this often necessitates deep excavations. Such excavations may be eliminated by ramping the driveway up to the point at which the wagon discharges and placing the hopper at ground level.

Where the grain is delivered in sacks, as in the Argentine, single hoppers can be used for reception at a rate of 40 tons per hour, but where the grain is delivered in bulk, as in North America, such hoppers should handle 80 tons per hour. Fig. 8 shows an example of a reception pit in which a belt conveyor is used to deliver the grain from under the wagons to the elevator boot.

At terminal elevators the grain is usually received from railways. Whether grain is received in bulk or in bags has a very great effect on the size of the reception pit. The new elevator at Ingeniero White, Argentine, owned by the Buenos Aires Great Southern Railways, is designed for receiving the grain in bags and has six lines of eight hoppers, each with a capacity of 45 tons, and sufficient platform space between the lines for the baling of bags. Fig. 9 shows a cross-section through this unique reception pit at a transverse conveyor. The cost of such pits forms a large part of the entire cost of the elevator.

Where the grain is received in bulk, two men with power-operated shovels can empty a 45-ton carload in 20 min. Fig. 10 shows the cross-section of a typical North American transfer elevator where power shovels are used. Car dumpers have also been used that can empty a 45-ton carload in 10 min.; reception pits for such elevators must be designed to the machinery supplier's requirements.

Bin arrangements

Large elevators are generally subdivided into at least two sections—the main storage and the working-house. The main storage consists of a series of bins with conveyors above for distributing the grain and below for transporting it away. The working-house is occupied by the elevating, weighing and cleaning machinery, and requires bins of suffi-

FIGS. 7 AND 8—GRAIN-RECEPTION PITS for country elevators, with and without conveyors.

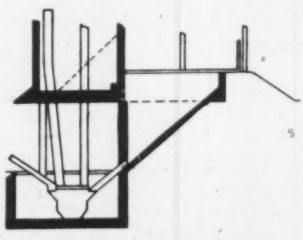


FIG. 7 Single Hopper Type

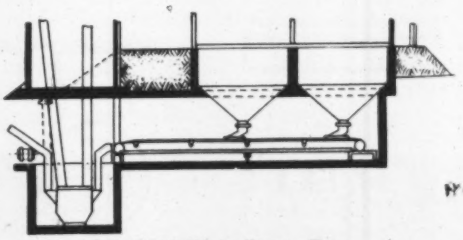


FIG. 8 Multiple Hopper Type

cient capacity to hold the grain to be treated. Small elevators usually combine the storage and working sections and can often be arranged so that the grain is spouted directly to and from the bins, eliminating the use of conveyors.

Proper bin arrangement is basic to a most economical plant. The shape, size and value of the land at the site are most important factors for the building work, while the arrangement of the conveyors above and below the bins is important from the mechanical standpoint. Economical building and machinery schemes should then be combined so that the maximum economy is obtained for the combination. Special bins and spaces for elevator legs, lifts, stairways, etc., will control the arrangement for small work, but become minor factors in the case of large elevators.

Main storage bins

The individual bins for a large elevator are seldom required to have predetermined capacities, so that the designer is free to find the most economical arrangement and sizes, although it is fundamental that no bin should have a capacity less than that of a railway car. Determination of the size of bin that shows the maximum economy involves the cost of the slab over the bins, the bin walls, the slab under the bins and the cost of the foundation. The writer has come to the conclusion that in general the most economical reinforced-concrete bins are circular, from 19 to 21 ft. in diameter and about 90 ft. high. On this basis the cheapest method for storing grain is to subdivide the available storage space into circular bins of 500 to 600 tons capacity.

The most usual scheme for arranging the bins is shown in Fig. 11a, the storage being subdivided into main and interstice bins. Such an arrangement, with bins of 20-ft. diameter, can be conveniently filled by a single conveyor above and discharged by another conveyor below. The tangential walls can be the same thickness as the remainder of the bin wall.

In another arrangement the bins may be separated by straight walls as shown in Fig. 11*b*, thus forming interspace bins. As an aid in preparing preliminary designs, the following conclusions arrived at by the writer may also be stated: the economical limit for the clear span of straight-bin walls is usually from 10 to 12 ft.; circular-bin walls should never be permitted to act as arches, in interstice or interspace bins, for more than a quarter of a circle.

The arrangement shown in Fig. 11*c* is seldom adopted because the interstice bins are too small; for the usual sizes of main bins they hold less than half a railway carload. Nevertheless, this method was used on the Rock Island Lines elevator at Kansas City, Kan., and Fig. 11*d* shows the awkward arrangement of the bins at a corner of this elevator. The method shown in Fig. 11*e* is more practical and was adopted on the Grand Trunk Pacific Railway's elevator at Tiffin, Ontario. The outside walls for the pocket or interspace bins may be either curved or straight, as shown in Figs. 11*f* and 11*g*. The curved or segmental walls should have a span, between end fillets, not exceeding 10 ft.

It is usual when providing for pocket bins to space the main bins as shown in Figs. 11*h* and 11*j*, which are actually combinations of Fig. 11*b* with Figs. 11*f* and 11*g*, respectively. This arrangement not only increases the capacity of the pocket bins but simplifies the spouting to and from them. It also decreases the heights necessary for these spouts where the conveyors are centrally situated (as is usual) under the main bins. The layouts shown in Figs. 11*g* and 11*j* are usually adopted where the land is very valuable.

From a careful analysis of the plans mentioned and the economical dimensions stated above, the designer should have no difficulty in preparing a suitable layout for any irregular or limited plot of land. For unlimited and inexpensive land, Fig. 11*a* is preferable because of its simplicity, but for average conditions Fig. 11*h* will generally prove to be the most desirable layout.

FIGS. 9 and 10—Grain-reception pits at terminal elevators where grain arrives by rail.

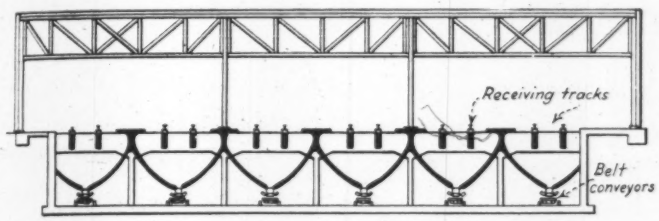
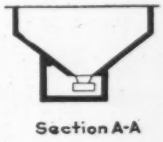


FIG. 9 A New Installation in South America



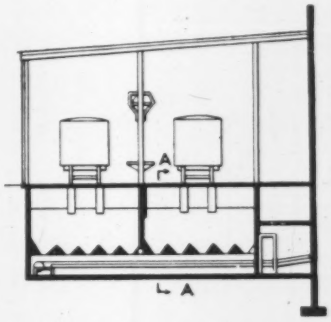
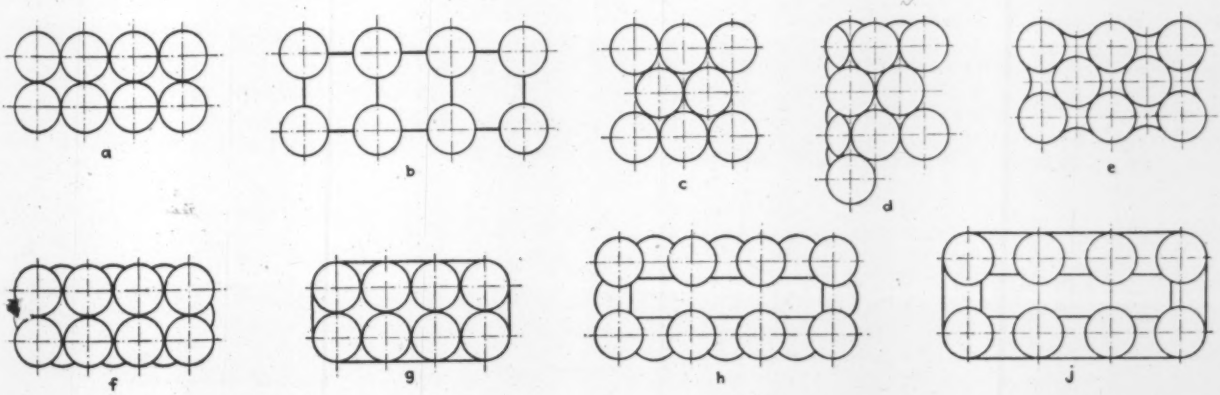


FIG. 10 Typical North American Transfer Elevator

FIG. 11—VARIOUS ARRANGEMENTS for main storage bins are possible. Experience indicates that circular bins of 500 to 600 tons capacity, 20 ft. in diameter by about 90 ft. high, are most economical and that the layout shown as *b* is in general the most desirable.



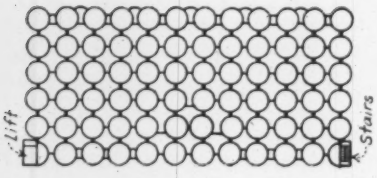


FIG. 12—PLAN of working-house bins at a large South American terminal elevator. These bins have a capacity only great enough to hold the grain actually being treated.

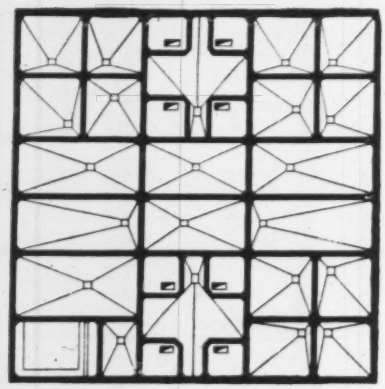


FIG. 13—PLAN of a working-house at Salina, Kan. Structure is more than 200 ft. high and was built with sliding forms. This is an unusually economcal and efficient layout.

The dimensions of a working-house are generally controlled by the size of the weighing machines, separators and general mechanical equipment to be housed. Nevertheless, a working-house must be capable of storing separately the amount of grain that will require individual treatment, and thus the size and number of the bins can only be determined from a knowledge of the quantity and quality of the grain to be dealt with. These bins may be either circular or rectangular. For the construction of the actual bin walls the circular shape is generally the more economical, but where the entire working-house is to be constructed with sliding forms, the shape of the bins should be rectangular in order that the formwork may be suitable for the beams above and below the bins.

Fig. 12 shows a section through the working-house bins of the railway elevator at Ingeniero White, Argentine. It may be mentioned that the columns from a high structure above are carried down through the bins, and that the positions of the walls are adjusted to accommodate the elevator legs, lifts, compensating hoppers, etc.

The rectangular bin is, however, the most common arrangement, although great care must be exercised in designing the straight walls. The most economical of such bins so far as sliding formwork is concerned are from 11 to 13 ft. square and have 6-in. fillets at the corners. Fig. 13 shows a plan of the working-house of the Shellabarger terminal elevator at Salina, Kan., which is more than 200 ft. high and was designed for sliding forms. This layout is typical of many North American working-house plans, wherein the mechanical designer must work at all times in conjunction with the builder.

Country elevators

Since timber is generally the most economical material for the construction of country elevators in North America, no common or generally accepted layout for small reinforced-concrete elevators exists. However, the graphs shown in Fig. 14 have been prepared from comparisons of elevators designed and built under the same conditions but having various numbers of bins. The bins and houses were designed for sliding formwork, and the foundation includes reinforced-concrete rafts. Although the actual quantities of concrete involved vary with each case, the graphs show the tendency and result of increasing the number of bins. Country elevators with a capacity up to 1,500 tons can usually be designed without conveyors, but beyond that capacity the elevator pit becomes too deep, the hoppering at the bottom of the bins becomes too considerable and the elevator house too high for economy.

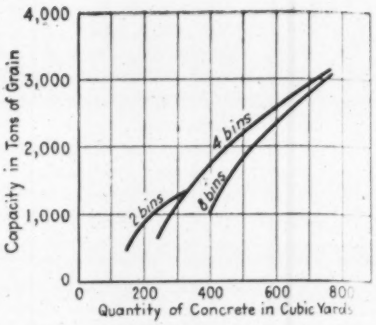


FIG. 14—CONCRETE required to construct country elevators of given capacity in 2, 4 or 8 bins.

The necessity of providing for extensions and also the methods of construction, whether by sliding forms or stationary forms, are further important factors that must receive attention. Fig. 15 shows a 500-ton elevator suitable for sliding formwork, while Fig. 16 shows a 1,000-ton elevator also suitable for sliding formwork but not so convenient for extension. Figs. 17*a* and 17*b* show plans suitable for elevators with capaci-

FIG. 15-18—COUNTRY ELEVATORS of various capacities from 500 to 2,000 tons.

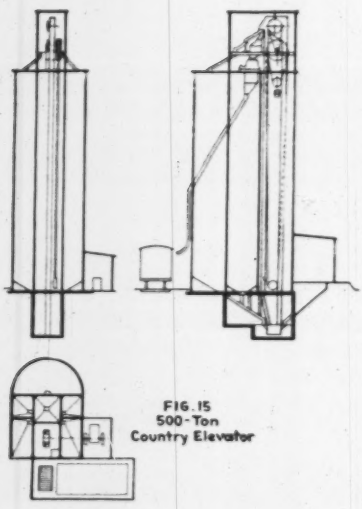


FIG. 15
500-Ton
Country Elevator

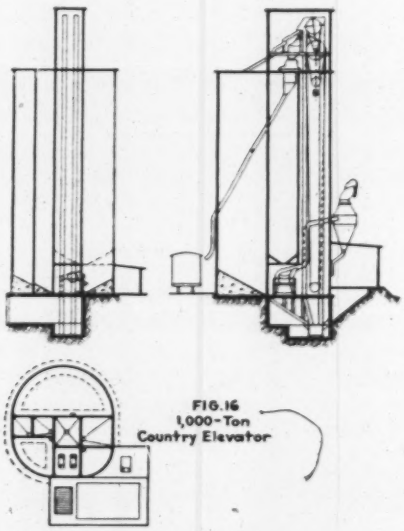


FIG. 16
1,000-Ton
Country Elevator

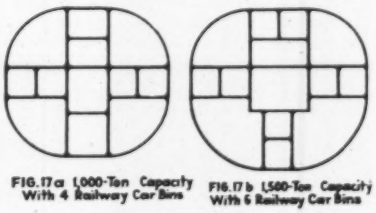


FIG. 17a 1,000-Ton Capacity With 4 Railway Car Bins

FIG. 17b 1,500-Ton Capacity With 6 Railway Car Bins

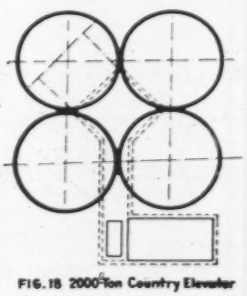


FIG. 18 2000-Ton Country Elevator

ties of 1,000 and 1,500 tons, respectively. The elevator in Fig. 18 has a capacity of 2,000 tons and necessitates the adoption of a receiving hopper. Although the headhouse must be constructed with stationary forms and the scheme does not lend itself very well to extension, it is a most economical elevator for the capacity. However, except in maize areas, a country elevator with a capacity of 2,000 tons is generally required to be subdivided into more than four bins.

The circular headhouse is frequently used, but it involves too much waste space because weighing machines and elevators are rectangular. Small elevators may be rectangular, and they then resemble the type of working-house shown in Fig. 13. Country elevators of more than 3,000-tons capacity can usually be subdivided into the working-house and main storage, and then the bin arrangements conform to those discussed for terminal layouts.

Demolition in Chicago by Consent of Owner

Coordination of six agencies after five-months effort to unwind red tape makes possible razing of useless unfit houses which law-hampered authorities cannot or will not risk condemning

COLLAPSE of a wooden residence structure recently in Chicago, which seriously injured several children playing in the house, is the third happening of the kind in three months with attendant loss of life and injury. This occurrence, together with the concerted action of many organized agencies interested in housing, has accelerated the slum-clearance program. To date, it has been carried out on a "consent-of-owner" basis.

Last winter one phase of the CWA census surveys had to do with the condition of buildings in the more congested areas of the city. Some 6,000 suspected buildings were surveyed, of which 4,000 were found to be in need of major repair and 2,000 were considered beyond repair. A ring of blighted residential buildings around the Loop, or central business district, was evident. Also west of the Chicago River, between 12th and 16th Sts., there was a heavy grouping of outmoded buildings. The negro district to the south was especially bad. Factories and commercial buildings are interspersed in these areas; and while the residential trend is outward, old houses are not being replaced fast enough by industry and commerce to prevent blight. While many agencies have been interested in promoting housing, slum clearance and demolition, some half-dozen official and unofficial bodies have, through cooperation and intensive effort extending over a period of five months, made a definite start on the demolition of the 2,000 useless buildings unfit and unsafe for habitation. It is the purpose of this article to indicate the correlation of these agencies, the powers and limitations of governments and the methods adopted by which finally it has been made possible to get this job done legally.

The physical problem of demolishing a structure is simplicity itself compared with the unwinding of the legal red tape involved in tearing down an old rookery, long past its period of useful life. The Metropolitan Housing Council (MHC) was formed as a correlating body early in the year with representatives of engineering and architectural societies, social service agencies, financial and real estate interests, improvement associations and all of the governmental agencies involved, such as the Illinois State Housing Board (SHB), City Housing Authority, building and health commissioners, CWA and Illinois Emergency Relief Commission (IERC).

CWA Census—The building survey made by CWA census investigators last winter was based on minimum requirements of the state and city, sanitary and building legal requirements. Windows and doors were often found broken or removed by vandals. Leaky roofs were common. Poor plumbing was a common ailment. Vandals seem to attack plumbing first. Basement plumbing may be removed while the upper floors are still occupied, drainage meanwhile converting the cellar into a cesspool. The same supervisor who started this work is still employed under the IERC in working up results and taking care of demolition.

Building Commissioner — Normally the building commissioner can and does condemn buildings which are adjudged dangerous to life and limb. The owner is notified to remove the structure. If he does not do so, the department calls for bids, sending out such notice by mail to known wreckers. In the case of dire emergency the fire department is called on. It razes the building by putting a rope around it and pulling it down with a truck. Nothing in that case is cleared away, although vandals will soon carry away anything usable. Wreckers ask $50 to $300 to wreck structures, as the salvage is supposed to be left on the premises and be the property of the owner. Invariably the salvage disappears at once and only a rubbish pile is left.

If the owner accepts the notice, he may enter into a contract with the wrecker, who may do the job for the salvage, if the building is of frame. If of brick, however, the price charged is $50 to $300 since the salvage is usually only of dimension lumber which on the average will run 2 to 3 bd.-ft. per square foot.

The difficulty with demolition by condemnation is inherent in the Illinois Cities and Villages Act, which permits the police power to be exercised only when the structure is ready to collapse. The commissioner, should he condemn a building and effect its razing before this stage is reached, may be sued by the owner who might collect from the commissioner's bondsman.

Health Department — The health commissioner operates also under the Cities and Villages Act, but he has wider latitude in condemnation. Usually, however, boarding up doors and windows of an unoccupied house will legally satisfy his requirements. An attempt will soon be made to test his powers.

To strengthen the powers of condemnation of both building and health commissioners, amendments to the Cities and Villages Act are being drawn to present to the next session of the state legislature.

State Housing Board—The State Housing Board is a tax-supported board authorized to clear blighted areas in making provision for future housing. Its part in the present demolition-by-consent program is first to requisition labor for the project, both technical and field force, from the IERC, and, second, to call for and open bids from licensed wreckers. The contractor is to furnish general superintendence, tools, equipment and trucks to haul debris away from the site. Further, he agrees to include premiums on insurance policies covering workmen's compensation and liability insurance. This item is insisted upon by the IERC and is the one thing causing most of the difficulty over the country generally in putting relief men to work on useful projects, since neither the state nor federal relief money can be used to pay insurance premiums. By consent of the owner the salvage goes to the wrecker. It is not expected that much money will be bid, but on the last group of 24 houses $800 was realized, which went into the general-funds account of the state treasurer.

The SHB selects the successful

wrecker, who executes a contract not with the board but with the owner direct. This prevents the board getting into the details of the house-wrecking business.

Owner—Owners are invited through publicity, through the efforts of MHC or the demolition engineer of the IERC, to offer their useless buildings to the SHB or to the IERC, but there can be no commercial motive involved. The financial status of the owner is not a factor; in fact, many eligible useless houses are owned by well-to-do citizens. Formerly the owner had to seek a demolition permit from the building commissioner, which costs a minimum of $5 per structure. The MHC was instrumental in getting a city ordinance passed waiving the permit for these "consent" cases, but nevertheless information is transmitted by the wrecker to the commissioner's office for record purposes.

The request for demolition by the owner to the SHB is the first part of a wrecking contract; the second part is the acceptance by the wrecker. Three copies are made, one for the owner, one for the wrecker and one for the IERC.

Wrecking Contractor—In Chicago all wreckers are licensed, and in consequence the number is limited. The workers are strongly organized, but many of them are on the relief rolls. The work is one of the most hazardous, and insurance rates are high.

After award of the contract the wrecker executes the second part of the document noted above, being a contract with the owner to furnish superintendence, tools, equipment and insurance. All of this legal work is carried out in the offices of the SHB, with the demolition engineer taking active charge of proceedings. He notifies the wrecker when to appear, giving a priority list, since these useless houses are scattered all over Chicago. Generally speaking, union men are employed, draw union rates of pay and are permitted to work long enough to earn their relief "budget," usually 24 hours per week for two to three weeks a month.

The above procedure is considered in Chicago as being not more than a start at demolition. Only a few houses had been wrecked since Mayor E. J. Kelly initiated the program June 1. The MHC, however, feels that the five months' effort was worth while and now is concentrating its forces on demolition by condemnation.

Active in the various organizations involved are John R. Fugard, president, MHC, which acted as a coordinating agency; Alfred K. Stern, chairman, Illinois State Housing Commission, and W. S. Haldeman, demolition engineer, IERC, who bore the brunt of the work in actually contacting the various agencies, calling on such volunteers as were necessary to obtain interviews and entree, and following through all of the demolition phases.

Bending-Moment Determination in Highway Bridge Slabs

By Robert B. B. Moorman
Assistant Professor Civil Engineering, University of Mississippi, University, Miss.

IT IS ADVANTAGEOUS when designing a number of structures of the same type to simplify certain data utilized in the analysis. Such simplification, for determining the live-load bending moments in highway bridge slabs of certain limiting span lengths, is attempted below. The standard specifications for highway bridges of the American Association of State Highway Officials (1931) are taken as a basis for the derivation of the equations for *H*-10, *H*-15 and *H*-20 loadings.

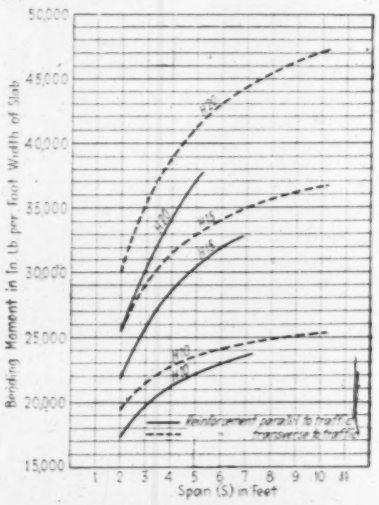
According to the specifications, the wheel load of a truck is considered as acting over an effective width called *E*. This effective width is classified under two cases—reinforcement parallel to the traffic and reinforcement transverse to the traffic. For Case I the effective width, in ft., is taken as $E = 0.7S + W$ with a maximum of 7 ft., where S = span of the slab in ft. and W = width of tire in ft., depending on the weight of the truck.

Since the specifications state that the width W of each rear tire may be assumed as 1/12 of the total loaded weight of the truck (i.e., 1 in. per ton), the above equation may be written

$$E = 0.7S + H/12$$

in which H is the number representing the tonnage of the truck under consideration; for *H*-10 loading this number is 10.

The distribution of the total load P of the truck is taken as 0.1 P on each front wheel and 0.4 P on each rear wheel. The single-wheel load to be used in the computations will then be 0.4 P or 0.4×2,000 lb. (The spacing of the wheels is taken as 6 ft. c. to c., and the spacing of the axles as 14 ft. c. to c.)



BENDING MOMENTS per foot of bridge slab for various loadings and two arrangements of reinforcing.

Since the specifications state that the moment to be used in design is 80 per cent of the simple beam moment, the equation for the bending moment (one wheel-load) may be written

$$M = \left(\frac{0.4H2000}{0.7S + \frac{H}{12}}\right)\frac{S}{4} \times \frac{8}{10} \times 12$$

$$= 23040\left(\frac{SH}{8.4S + H}\right) \quad \ldots\ldots (1)$$

where M = bending moment in in.-lb. per ft. width of slab.

The following tabulation gives the maximum span lengths for which Eq. (1) is applicable.

Loading	Span of Slab in Ft.
H-10	S = 7.38
H-15	S = 6.78
H-20	S = 6.19

For Case II the effective width, in ft., is taken as

$$E = 0.7\ (2D + W)$$

where D = distance in ft. from the center of the near support to the center of the wheel.

If a wheel is placed at the center of the span, this may be rewritten

$$E = 0.7\left(2\frac{S}{2} + \frac{H}{12}\right),$$

and the equation for the bending moment may be written

$$M = \left(\frac{0.4H2000}{0.7\left(S + \frac{H}{12}\right)}\right)\frac{S}{4} \times \frac{8}{10} \times 12$$

$$= 32914\left(\frac{SH}{12S + H}\right) \quad \ldots\ldots (2)$$

This expression should not be used for a span greater than 10.25 ft.

The accompanying diagram shows values of bending moment, in in.-lb. per ft. width of slab, plotted aginst the span of the slab in ft., using Eq. (1) and (2) respectively.

Throughout the above computations it has been assumed (as in the specifications) that it is necessary to find the maximum moment before determining the effective width, and not to determine that combination of the bending moment and effective width which would produce a maximum bending moment per foot width of slab.

The effect of impact must be added to the above values.

Vancouver Meeting of Civil Engineers Centers on Columbia River

First joint meeting of Am. Soc. C.E. with Engineering Institute of Canada—Five technical divisions deal mainly with western problems—Roads and sanitary questions also discussed

DEVELOPMENT of the Columbia River now under way and experiments on draft tubes in connection with it formed the most prominent theme of discussion at the meeting of the American Society of Civil Engineers in Vancouver July 11, 12 and 13, in which the Engineering Institute of Canada participated. Reservoir silting, the Fort Peck regulating dam, advances in sanitation and highway projects also received attention.

The mutual good will that obtains between the engineers of Canada and the United States and the desirability of a more frequent interchange between them were stressed by several speakers during the two days taken up by technical sessions. Addresses of welcome at the opening session on Wednesday morning by F. P. Shearwood, president of the E.I.C., and Harrison P. Eddy, president of the American Society of Civil Engineers, also emphasized the international unity of the profession.

In his annual address, President Eddy spoke on the subject "Trends in Engineering as a Profession in the United States," touching on tendencies that many engineers have pondered over in these days of rapid transition. He showed how the engineer's field is extending and emphasized the importance of equipping to meet new problems. The trends which he discerns include, a more certain professional status founded upon specialized educational training and the rendering of disinterested counsel and advice; greater need for scholastic and continuation education; more engineering in industry and a greater influence of industry upon the practice of engineering; a greater degree of standardization; more specialization; more dependence upon research; an increasing number of engineering employees; and greater activity of engineering societies, particularly in the field of social activities.

Columbia River power

The Columbia River, in some torm or other, was the central theme of a notable group of papers. The stream being international, both nations are interested, and international agreement now provides for maintaining gaging stations on all seventeen of the international streams that are tributary to the Columbia River west of the Rockies. Snow surveys similar to those made in Nevada are now being conducted on the watershed, and it was urged that a service for the prediction of river flow similar to that which is now maintained on the Fraser would be highly desirable.

Navigation on the Columbia River is confronted by many difficulties, it was pointed out, because, although this is the seventh largest river in the world, on much of its length it partakes of the nature of a mountain torrent. The jetties at the river's mouth now maintain a depth of 45 ft. over a width of three-fifths of a mile; in the 108-mile length of the river between Portland and the sea, federal dredging has maintained a 32-ft. to 35-ft. channel.

The Columbia, rising 300 miles east of the Pacific in Idaho and Montana, flows north into Canada and then south through Washington to the Oregon line, along which it extends west to the Coast. Its total length is 1,200 miles; its maximum flow is 450,000 sec-ft. at the international line, just below the mouth of the Pend Oreille, about 500,000 sec-ft. at Grand Coulee, and about 1,200,000 sec-ft. at Bonneville, a short distance above Portland. In its early days it served navigation extensively in its lower course and in various flat reaches in Canada, but navigation has practically disappeared except from Portland to the sea. In Canada power is the main interest, according to a paper by Maj. J. C. MacDonald of Victoria, Comptroller of Water Rights for British Columbia; about 250,000 hp. is installed and much more can be developed, especially by aid of storage in the Arrow Lakes and Kootenay Lake, either of which through a 20-ft. rise of level could provide 2,000,000 acre-ft. of storage.

Effective development of this water power invites international cooperation, Major MacDonald stated, adding that once the proper spirit of cooperation is established it should be easily arranged for.

Grand Coulee

At Grand Coulee, 150 miles south of the international line, the power development that is to form part of the Columbia Basin project and ultimately furnish more than 1,000,000 hp., is now in process of having its first stage constructed. The first or low stage involves a dam 2,500 ft. long and 300 ft. in maximum height above rock, raising the water level 150 ft. As described by Frank A. Banks, construction engineer of the project for the U. S. Bureau of Reclamation, who outlined the extraordinary geological conditions that characterize the region and the features of the proposed development, the high dam will be 4,000 ft. long and 500 ft. high above lowest foundation, creating a head of 350 ft. Both the low and the high dams will have an 1,800-ft. spillway length, to discharge 1,000,000-sec-ft. floods, involving an overflow depth of 26 ft. In the low dam the spillway will be uncontrolled, while in the high dam it will have drum gates. The initial power installation will comprise three units of the eighteen contemplated in the ultimate high-dam development, and will develop about 100,000 kw. as compared with the 1,890,000-kw. installed capacity (18 main units) of the high dam.

About 20 per cent of the ultimate power is to be used for pumping irrigation water into Grand Coulee to supply Columbia Basin, while 80 per cent will be available for sale.

The dam will be founded on granite. A bucket formed at the downstream toe of the spillway is to destroy the energy of the falling water; experiments on models are in progress at Fort Collins, Colo., to determine its best form.

The dam and power plant (ultimate development) are to cost $168,366,000, and the irrigation works $208,265,000, a total of $376,631,000, of which $260,000,000 must be invested before the earnings of the power installation, if fully utilized, will be sufficient to reduce the investment. Power income is to pay for half the cost of the irrigation works.

Diversion of the river during construction is planned to be carried out by cellular cofferdams of steel sheeting driven to rock, parts of the dam on the two sides of the river being built in turn, and the center closure then being made while the river is flowing through low panels of the side sections.

Problems at Bonneville

The power development of Bonneville, 50 miles above Portland, was described by Maj. C. F. Williams, U. S. Army district engineer at Portland, who is in charge of construction. Bonne-

ville is the lowest point on the river at which rock foundation for a dam is available. The river here is divided into a main and a back channel by an island; the Oregon side affords a lock site in a through cut in andesite, which rock also extends across the back channel to the island and provides an excellent foundation for the power house, now under construction. The spillway (or main dam) across the main channel must take care of a floodflow of 1,200,000 sec-ft.; it is to consist of a low concrete weir founded on rock 60 ft. below water surmounted by eighteen vertically sliding gates, 50 by 50 ft. It is to be built in two halves within crib cofferdams carried out from the two banks in a dredged trench and faced with steel sheeting driven into the soft rock. The crest is kept low, and the gates are made high so as to keep the flood level below the Cascade Lock pool, a few miles upstream, and avoid excessive flowage damages. The precise form of the spillway is being determined by test on a model, to assure maximum energy destruction. A dentated sill at the toe is to aid in developing the hydraulic jump on the 100-ft. apron.

Because of highly variable head and load, turbines of Kaplan type have been adopted, for 66,000 hp. at mean head (55 ft.) and 75 r.p.m., with 23-ft. runner diameter and a discharge of 12,500 sec-ft. per wheel. Built for six units out of the ultimate ten, the plant will cost $31,000,000, while the ultimate installation will cost $44,000,000.

The lock is a single lift, mainly because the rock section was only long enough for one lock. As the maximum head is 67 ft., the lift is among the highest in the world if it is not the highest. Experimental studies of the filling culvert arrangement, to reduce disturbance of water in the lock, are in progress; they indicate that a four-culvert arrangement like that at Panama is most favorable.

Navigation on the river has no value for grain shipment, according to J. P. Forde, district engineer of the Canadian department of public works, New Westminster, B. C. Official studies of the economics of grain transport by the speaker were unfavorable to water transportation from the interior areas to the sea. John C. Stevens, consulting engineer, Portland, stated that the purpose of improving the lower river is to carry ocean-going vessels to the Dalles, well above Bonneville, to permit of building up at the power plants industries that could not afford to pay the higher cost of power transmitted to tidewater. He holds that, while such development may not come in our generation or the next, it will come in time.

Bonneville power-plant design was discussed by B. E. Torpen, engineer, Corps of Engineers, U. S. A., who showed how floodflow in the river will decrease the head on the units and maximum head will be obtained at low-water stages. Although there will be constant variation in head, 56 ft. will be available about 50 per cent of the time. A feature of the power-house design is a retaining wall at one end, made necessary by the plan to extend the plant later. This wall will be 120 ft. high, 12 ft. thick above the spread-footing base, and 3 ft. thick at the top, heavily reinforced to withstand hydrostatic pressure on one side if construction conditions require it to carry unbalanced load.

Probably transformers of outdoor type will be placed on the roof of the power house; transmission lines probably will be built on both sides of the river. The power-house substructure is to be completed in the summer of 1935 and the generating equipment in 1936.

Fishways are receiving particular attention because of the 40-ft. variation of the water level involved and the fact that 100,000 salmon will have to be handled daily at certain seasons. Experiments with various devices for handling the fish at the dam are being watched with much interest by the fishing industry because the value of the salmon pack above this dam is eight to ten million dollars annually.

D. C. Henny, consulting engineer, Portland, drew attention to the novel intake-apron design, which keeps the concrete up off the rock foundation, carrying the load to the piers of the intake structure and, by putting the water load on the piers, increasing stability against overturning. He spoke also of the 1,200-ft. width of Bradford island between power house and spillway dam which may require a tight cutoff of some sort costing perhaps as much as half a million dollars.

As chairman of an Oregon commission, Mr. Henny is studying the power-disposal problem that will arise with the development of Bonneville power. New markets must be found, he pointed out, because existing sources now have a surplus of power. Bonneville will have the advantage that it offers large blocks of power on tidewater, but the rates must be low enough to permit industries to meet the cost of shipping their product to distant markets. Much the same power-disposal problems must be considered at Grand Coulee, Fort Peck and Alcova, he said, and all these studies, if carried on separately, will be costing money for overlapping work. He suggested that a federal commission that would give comprehensive attention to these several problems jointly would be highly desirable.

Draft-tube and scroll-case studies

Experiments with models of quarter-turn draft tubes were reported by Prof. C. A. Mockmore, of Oregon State College, Corvallis, who has tested a series of model draft tubes with 6-in. inlet diameter, representing Bonneville conditions on 1:46 scale. They were made of ⅛-in. pyralin heated and pressed into carefully formed wooden molds. These models permitted observation and photographic recording of turbulence. Two means of showing direction of currents within the tubes were used: (1) short lengths of yarn of different colors attached to transverse cords; and (2) air admitted to the intake through a pipe. The yarn streamers showed current direction, and the air pased through the tubes as a stream of bubbles, clearly showing the eddies and demonstrating spiral flow. Spiral motion was found responsible for much of the friction in a bend.

Professor Mockmore began with the objective of finding the shape, curves and other characteristics of the tube that would regain the largest part of the 26 per cent of velocity remaining in water leaving the turbine runners in the Bonneville hydro-electric plant. In other words, the efficiency of the tube was rated as its ability to reclaim the head which the water has on entering the tube. The Nagler, Moody and Woodward types of draft tube were tested, as well as other forms developed as the result of calculated values of friction, centrifugal force and other factors believed to affect results.

Shape was found to be as important as angle of flare; in fact, an optimum flare angle was used and efficiency was gained by adjusting the shape until the best design was obtained. The use of vertical fins reduced turbulence, and horizontal partitions were found to increase efficiency; it was noted that partitions should be continued well beyond the bend.

In general, the cross-section of all models began as a circle, flattened out into some sort of ellipse in the bend and terminated usually in a rectangle. The best shape showed hydraulic losses 30 per cent less than did the poorest. This most efficient shape resembled the Nagler bend, having equal areas that changed from the inlet circle to a flat ellipse in the bend.

Professor Mockmore gave credit to L. F. Harza, consulting engineer, Chicago, for design of the models, and to Howard L. Cooper, associate engineer in the Bonneville Dam office, for practical work with the models.

Mr. Cooper reported experimental studies of both draft-tube and scroll-case forms. The former were preliminary to the more complete tests conducted by Professor Mockmore. Scroll-case studies were made by operating on scale models having transparent top and sides, with the aid of sawdust and dye to make the streaming visible.

Partition shapes were developed that divide the entering water into three equal streams without turbulence or flow concentration, to supply the full periphery of the wheel equally. Moving-picture records made the actions clearly apparent. It was found to be difficult to avoid eddy formation

where the water passes around the guide vanes.

California's Central Valley plan

An outline description of the ambitious Central Valley plan worked out by California state authorities, primarily to deal with the tragic destruction of farm and home property in the southern part of the San Joaquin area through exhaustion of the underground water supply, was presented for Edward Hyatt, state engineer, by George W. Hawley, deputy state engineer. The essence of the plan is to regulate and conserve the flow of the Sacramento River, which occupies the northern half of the central valley and which, besides carrying abundant water, is subject to damaging floods, and utilize this water not only in the Sacramento but also in the San Joaquin Valley, by pumping it up the river in a series of locks to supply the lower course of the river. By this expedient the flood-waters of the river can be stored by a large dam and applied to the irrigation of lands already ruined or threatened with ruin in the upper valley. Specific items in the project are the Kennett Dam on the upper Sacramento, to store most of the 6,000,000 acre-ft. annual runoff by a gravity structure of 420-ft. height 50 miles south of Mount Shasta; relocation of 35 miles of Southern Pacific main line and 12 miles of the Pacific Highway; a power house of 275,000 kw. and a 50,000-kw. power house at a 90-ft. afterbay dam below; a transmission line; an industrial water conduit in Contra Costa County; the San Joaquin pumping system; the Friant Dam in the upper San Joaquin; and 150 miles of canal to distribute its storage. The cost of the project as a whole is estimated at about $170,000,000. It is proposed to be built through a PWA loan and grant supplemented by a federal contribution of $12,000,000 on the score of navigation and flood protection.

In the view of Col. T. M. Robins, division engineer, U.S.A., Portland, Ore., the project is an outstanding example of planning for river improvement to serve all interests once fully established. Navigation, now nearly extinct, may be expected through the project to reach 600,000 tons per year on either stream. John P. Hogan, consulting engineer, New York, characterized it as one of the best planned and most comprehensive of western projects, especially as it constitutes salvage rather than new development. J. B. Lippincott, consulting engineer, Los Angeles, said that as the project will save 200,000 acres from destruction, it must be built, but that the farmer should not be asked to bear all the load. He hopes that the federal government will build it as a federal project, with the generosity it has displayed elsewhere.

A project of equal magnitude already under construction was described comprehensively by Capt. Theodore Wyman Jr., U. S. Army, Kansas City—the Fort Peck Dam across the Missouri River near Glasgow, Mont. It is an outcome of a War Department study of river development under the 1927 authorization, and later allocation of an initial sum of $27,000,000 by the PWA toward its construction. Under the revised design it is to store 19,500,000 acre-ft. and release this so as to stabilize the flow of the Missouri at Yankton to a minimum of 30,000 sec.-ft., which will give a 9-ft. navigation depth on the lower Missouri, eliminate floods on the upper Missouri and allow much bottomland now useless to be farmed.

Fort Peck Dam is to be a hydraulic-fill earth dam 255 ft. high, 2,800 ft. thick at the bottom, 8,000 ft. long, supplemented by dikes extending its total length to 20,000 ft. The valley bottom is alluvium with rock 135 ft. down. The sides of the valley are shale, through which four tunnels of 26-ft. diameter are now being driven for river diversion and reservoir operation. Under the center line of the dam a steel sheetpile cutoff is to be driven to rock. Auxiliaries to the dam construction are a 185-mile transmission line of 60,000 kw. at 154,000 volts costing $1,800,000, to operate the hydraulic-fill dredges; a 20-mile railroad; and a construction camp to house at least 4,000 workers. Construction is expected to take four years. The volume of material in the structure is 98,000,000 cu.yd.

A study of silting

Silt carried in suspension in stream-flow and the silting up of reservoirs were discussed by J. C. Stevens, consulting engineer, Portland, who has made a very exhaustive compilation of data on this subject. In a tabulation of 33 large reservoirs he gave data listing the rate of silt deposition and the percentage of storage capacity remaining. Some have had their storage capacity cut down to a large extent, while in others the rate of silting has decreased as efforts to stop erosion in the watershed became effective. The useful life of a reservoir is not its capacity divided by the annual deposition, he said; in some power dams a reservoir fully silted up would not decrease the power output, while in some irrigation dams a 50 per cent filling of the reservoir would be destructive to the project. The fifth generation hence will see Boulder reservoir filled with silt, which in itself should be warning enough that this problem, as applied to all reservoirs, is one to which engineers should give very earnest attention. Protective measures on watersheds can make a great difference in the accumulations in reservoirs.

In discussion, cases were cited where streams carry up to 40 per cent silt by weight, and stress was placed on the desirability of more complete working out of the laws governing silt deposition and of movements of bedload and sediment in suspension.

Experiences in water sanitation

Describing the development of sanitary protective works in the large Mokelumne River supply system of the East Bay Municipal Utility District, Oakland, Calif., J. D. DeCosta, sanitary engineer of the district, placed algal control in the position of chief importance. The safety of the water is protected by watershed sanitation and patrol and by long detention to such extent that water flowing from the reservoir is usually safe bacterially, but some 50 m.g.d. of filtration capacity is provided and chlorination is used to give a factor of safety.

Taste and odor control is the primary purpose of additional treatment. Algal growths are usually troublesome in California waters because of favorable conditions of growth. In the bad season daily samples are collected by a field man using a plankton net and recording dissolved oxygen and temperature. Copper sulphate is used in a quantity based on the condition of the top 10 ft. of the reservoir. Activated carbon is kept on hand for emergency use. Other sanitary problems of the system are found in dead ends, especially at gates, and in cross-connections. A meeting with federal, state and local health officers two years ago resulted in an order by the state board of health to eliminate cross-connections.

Among interesting additional facts on water protection, contributed by Thomas H. Carver, assistant city engineer, Seattle, is the trouble caused by alders which spring up in logged-over and burned areas of the city's watershed in place of conifers. Caterpillars which feed on alder leaves have been found to increase the color count; the city now operates a nursery for young conifers to use in reforesting the watershed. In the matter of dead ends, he stated that Seattle runs a ½-in. pipe around the valves between pressure zones to keep the water alive. All cross-connections have been eliminated in Seattle.

J. A. Wade, chief engineer, and K. W. Brown, sanitary engineer of the California Water Service Co., San Francisco, reported experiences with various types of water contamination in the areas served by their company. Hydrogen sulphide, which often is troublesome, is removed by aeration or sometimes by chlorine; when it is present microscopic examination is always warranted to detect sulphur organisms. Fluorides occur in a few places in California water; methods of removal are being studied by the state board of health. Salt water is present in some areas around San Francisco Bay due to excessive well pumping, abandonment of old wells and faulty construction of new ones. As the water in the upper 75 to 100 ft. often has a high

salt content, the company carries the outer casing of wells below the first water gravel and fills the annular ring between the two casings with concrete.

Refuse problems

Inquiry of 66 cities along the coast, including British Columbia, revealed that while most have private collection and disposal, the tendency is toward municipal collection with financing by taxation or by service charges. This was reported by C. G. Gillespie and E. A. Reinke of the California department of public health, Berkeley. It was found that hog feeding is the most common method of disposal of garbage and either dumping on land or burning on dumps the most common disposal of refuse. Many cities favor fill-and-cover disposal as cheap and reasonably satisfactory. Of nine cities having incinerators, four burn mixed refuse and five combustibles only. Four cities dump their refuse at sea; Oakland, the largest, hauls mixed refuse to a point 25 miles from the nearest shore. Los Angeles, feeding 46,000 hogs on garbage, operates the largest hog farm in the world.

H. P. Cortelyou, engineer of construction at Los Angeles, reported some of the conditions observed in Los Angeles hog feeding. Besides the seasonal variations in quantity and make-up of garbage there is a variation due to economic conditions, the last few years showing a greatly reduced feeding power of the garbage.

Dangers in sewage irrigation

In a progress report of the committee on salvage of sewage (a joint committee of the sanitary and irrigation divisions) some findings on the use of sewage for irrigation were reported. They suggest that such use may involve health hazards unless properly safeguarded. Nine states reported in answer to inquiry that they have had experience with sewage irrigation and with crops produced thereby, and of these nine no less than four traced epidemic illnesses of sewage-pollution character to this irrigation. Four others of the nine reported no difficulty. In another, sewage is discharged raw into streams and later the polluted water is diverted for irrigation; here the incidence of intestinal disease is high, and "the health officer believes that no crops grown within a foot of the ground surface should be irrigated with sewage-polluted water." A. M. Rawn, assistant chief engineer, Los Angeles County sanitation district, Los Angeles, said that the committee is considering a standard for irrigation water; where there has been experience with sewage irrigation, it is believed that the act may be so accomplished as to eliminate menace to health and public nuisance.

Unusual road project

A proposed highway through British Columbia to Alaska was the subject of a paper by Major Malcolm Elliott, Corps of Engineers, U.S.A., who pointed out that a route some distance back from the coast is entirely feasible and not unreasonably expensive. In summarizing what has been done thus far on reconnaissance and construction on the route, he said that of the 2,100 miles from Vancouver to Fairbanks (Dawson route) 1,183 miles remain to be built, some 183 miles of this being in Alaska and about 1,000 miles in Canadian territory, thus necessitating joint action on the part of the two governments.

Based on the estimates for a graveled surface 16 ft. wide on a 24-ft. width of subgrade, the cost would be about $12,000,000 for the part of the work in Canada and about $2,000,000 for [illegible] in Alaska. The route could be located with no passes above El. 4,500. On the northern part of the route, where the soil is continually frozen down to solid rock except in the summer season, the plan of construction would be to expose the subgrade one season and work it into shape the next, thus avoiding working frozen ground.

Several other road papers were presented, among them one describing the picturesque difficulties of mountain road construction over the Continental Divide near Glacier Park during the past ten years, by J. Ewen and A. V. Emery, of the Portland office of the Bureau of Public Roads.

Problems of Western Canada Discussed by E.I.C.

Bridges, port planning and sewer-outfall construction dealt with in the Engineering Institute of Canada's sessions at its Vancouver meeting with the Am.Soc.C.E.

AT THE JOINT MEETING of the American Society of Civil Engineers with the Engineering Institute of Canada at Vancouver last week the combined sessions of the societies were supplemented by separate sessions of the Canadian engineers for the discussion of works and problems of their own. The program was fitted to the location of the meeting, for the papers all related to Vancouver or British Columbia projects. Two of the papers dealt with bridges, one with port and harbor development and one with the construction of a difficult sewer outfall.

In an address at a luncheon in which the two societies joined, a noteworthy accomplishment of the engineers of Western Canada was outlined by Dr. E. E. Brydone-Jack under the title "The Growth and Work of the Association of Professional Engineers in British Columbia." The speaker, a veteran educator and former president of the Association of Professional Engineers, told of the steady advance that has been made in the province toward organizing the profession in a form somewhat comparable to that of the medical profession, with a view to sound regulation of practice and ethics. Efforts to this end reached their first success about fifteen years ago in the passage of registration acts. Today the association is the legally established registration agency of the province. It enrolls engineering student members as "pupils" in the third year of their college course or at the corresponding stage of progress of non-college entrants. On the graduation of the student it registers him as "engineer in training." Four years later he may, upon presentation of a satisfactory thesis or report, be registered as "professional engineer." The association's membership in these three grades is 200, 250 and 800. Under this system, with suitable reciprocity provisions, the profession in British Columbia is a self-governing corps.

Timber-bridge economy

Greater economy in the cost of construction and maintenance and the prolongation of the life of timber bridges by the use of treated timber and laminated top and bottom chords was advocated by Patrick Philip, chief engineer and deputy minister of the British Columbia department of public works.

The mountainous nature of the country through which the provincial highways pass has required the construction of more than 4,000 bridges, totaling about 60 miles in length. Steady increase in cost of construction and maintenance demands that more than the usual 15 to 20 years of life be obtained from the exposed untreated structures previously used. Research and experiment by the department of public works have resulted in an improved bridge with a life of probably 40 years, which has laminated chords of short panel lengths and thus eliminates the more expensive timber of longer length and dimension. All framing is done before treatment, and members are bolted together and matchmarked before shipment. Such bridges cost from 12 to 15 per cent more than the old types.

Maj. W. G. Swan, consulting engi-

neer, Vancouver, former chief engineer of the Vancouver Harbor Commission, discussed the application of town-planning principles to the development of harbors, with special reference to the Vancouver and Fraser River harbors. The national importance of major seaports, he premised, is particularly prominent in the case of these two, which with one other are the only commerce outlets from Canada to the Pacific Ocean.

No general plan has been developed covering their final development, but detailed plans covering sections of waterfront and other transportation facilities have been planned and in some cases effected. Improvements that have received preliminary study include the First Narrows Bridge, construction of locks at the Second Narrows in order to make the inner harbor a fresh-water basin, reclamation and filling of various sites, and the construction of a harbor belt line and additional terminal railroad facilities for the entire inner harbor. These projects will no doubt be constructed within the next few years, the author stated.

Sewage interceptor and outfall

How the Vancouver & Districts Joint Sewerage and Drainage Board planned and constructed an intercepting sewer to divert sanitary sewage from four outfalls serving 7,500 acres with an ultimate population of 270,000 and to deposit sewage 3,000 ft. from high-water mark in English Bay was described by the board's engineer, Gordon M. Gilbert. Two years' study of tidal currents in English Bay was necessary to determine a location that would avoid contamination of the adjacent bathing beaches.

Special points of interest in the design of the submarine outfall were: (1) the determination of its capacity under the extreme conditions of maximum domestic flow, maximum rainfall and extreme high tide, and (2) the fact that the outfall was to be set on pile bents in a trench dug on a soft sandy bottom, under a head of 70 ft. at extreme high water and at a site subject to westerly winds and choppy seas. All underwater work was done by a squad of divers. Ingenious methods of determining line and grade of the trench, pile bents, caps and pipe work were devised.

The intercepting sewer, 25,000 ft. long, was built to the Boston horseshoe section, of diameters varying from 4½ to 8 ft. Special provision was made for regulating stormflow into the interceptor during periods of heavy rains by the use of diversion weirs in conjunction with regulating machinery. Grit chambers were constructed at the junction of sewers with the interceptor to prevent the entrance of grit.

Second Narrows Bridge

From the opening of the bridge across Second Narrows, Vancouver Harbor, in 1926, the bridge suffered a number of collisions by vessels due to tidal conditions. Finally on Sept. 19, 1930, its 300-ft. draw was destroyed by the impact of a large steamer. It has now been rebuilt, being opened to traffic on July 1, 1934. Col. P. L. Pratley, consulting engineer, Montreal, described the reconstruction of the substructure, involving the removal of one of the original piers and the construction of two additional piers for a lift span of 286 ft., to provide a navigation fairway about 100 ft. wider.

The Foundation Company of Canada built the two piers. The southerly one was required to be of the pneumatic type in order that the foundation rock might be bared for inspection; the contractor chose to sink the northerly pier by the open-dredging caisson method to a satisfactory foundation on gravel bottom. Tidal conditions at the site made the control of floating caissons extremely hazardous. In the removal of the old pier by the explosion of 5,000 lb. of 60 per cent dynamite in eleven sets of drill holes, detonation of some of the charges did some damage to the south pier.

Letters to the Editor

Municipal Water Rates

Sir—In his article on "Rational Rate Structures for Municipal Waterworks" (*ENR*, May 31, 1934, p. 715), A. W. Consoer has made many valuable suggestions and has emphasized a number of points which, if given the attention that their importance warrants, would result in a more rational method of financing and managing public utilities, particularly those of our smaller municipalities. While the author does not suggest any one method for computing the rates to be paid as hydrant rental, for example, his discussion of the question should evoke thought of this subject, which too often is handled in a haphazard manner. As engineer-examiner in the office of the state engineer PWA (Louisiana division) the writer has had occasion to examine applications for loans for the construction or extension of a number of municipal water systems. The most of these are planned to be self-liquidating, revenue bonds being offered as security.

In some of the applications no mention is made of revenue to be derived from the fire-protection system, though a large portion of the expense of construction is to be incurred for the specific purpose of affording such protection. In other cases the hydrant-rental rate is placed so high that it constitutes an abnormal proportion of the anticipated revenues. In very few, if any, cases is there evidence of an analysis of the situation in arriving at the rate to be paid for fire protection.

The author suggests one principle of rate fixing, however, with which the writer cannot agree. Mention is made of the points of similarity between waterworks systems and other municipal utilities. With certain of these, notably electric energy, there can be no valid argument advanced against an initial charge, whether it is called a "readiness-to-serve" charge, a "minimum" charge, or some other convenient appellation. But with water or sewer service, the situation is somewhat different. The health of the entire community may be dependent not only on making it possible for all residents to secure water and sewer service, but it may be essential that they all be compelled to make use of the utilities.

In at least one city (New Orleans) this truth is so obvious that the itemized quarterly statement rendered to each householder begins with an item of a certain number of gallons of "free water." All services are metered, but the amount estimated to be necessary for the operation of one sanitary toilet is deducted from the bill. The writer feels that in the interest of public health, every inducement should be made to insure the use of a safe public water supply and a connection with the sanitary sewer system, and that full compliance with a law compelling each resident to avail himself of such utilities will more than offset the loss resulting from a failure to impose the otherwise logical "ready-to-serve" charge. With a properly designed rate structure, the amounts so lost may be recovered by making a slight increase in the rates charged the larger users. Perhaps the more logical plan would be to bill the cost of this free water against the department of public health, though it is doubtful if such a course would meet with general approval.

New Orleans, La., June 10, 1934. ARTHUR M. SHAW.

Mt. Morris Dam, Rochester

Sir—In your issue of June 28, p. 846, credit is wrongly given to me in connection with the proposed Mt. Morris Dam. I merely introduced Carl C. Cooman, civil engineer, to the Rochester Gas & Electric Corp. Mr. Cooman gave the talk and showed three reels of fully titled and very effectively edited motion pictures having to do mostly with the studies made on the unusually large one-sixteenth scale model of the 200-ft. overflow dam. Since Mr. Cooman was in charge of these model studies, I feel it is only just that he be given full credit for the talk before the recent S.P.E.E. meeting at Ithaca.

ERNEST W. SCHODER.
Professor of Experimental Hydraulics.
Ithaca, N. Y., July 3, 1934. Cornell University.

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In the Same Service

WHEN the engineers of two nations meet together, as did the American and Canadian groups last week at Vancouver, they recognize that they are in fact one single group engaged in the same service, and that national distinctions within the profession do not exist. They find themselves working on like tasks, utilizing like training and habits of thought and solving like problems; in detail of method they may differ, but no more than men always will differ by virtue of individual genius. It is this recognition that gives special value to international meetings of technical men and that inspires the wish that such meetings may become less rare. The cordial sentiment and live exchange of technical thought at Vancouver gave effective expression to this wish. Both Canadian and American members of the profession would find that more frequent joint meetings will give them a broadened view and a better understanding of their own work.

Highway Esthetics

TURNING MEMORY BACK over a decade of roadbuilding from the fresh recollection of a week's travel over construction now in progress in four states, the change that strikes the eye most forcefully is the purposeful planning of today for good appearance. This attention to esthetics is not confined to the great metropolitan parkways and the trunk lines connecting centers of large population. It is apparent in the wide roadway profile, dressed and planted slopes and sweeping curves of roadway line and grades that show up everywhere in open-country ordinary-purpose highway improvement. Roads passing through villages are laid out with the definite thought of making a better-appearing village as well as a better way for travel going through that village. The most striking fact is that this beauty is being sought in fitness of plan and design and by harmonizing materials with natural surroundings and not in introducing roadside fishpools and rock gardens. This departure from obvious artistry promises much for roadbuilding of the immediate future.

Work Planned in Advance

ALLOTMENT of $18,000,000 for continuation of the canalization work on the upper Mississippi River to carry that work forward another season indicates how rapidly the work is going ahead. Last year the PWA allotted $22,000,000 for locks and dams and $11,500,000 for dredging on the same undertaking. About $100,000,000 will be needed to complete the projected 9-ft. channel between St. Louis and the Twin Cities, Minneapolis and St. Paul. The reason why the work has gone ahead so rapidly is not hard to find; the army engineers had the plans for the necessary locks and dams ready to be put under contract quickly and knew where dredging was needed. The same is true of other army river work and the Mississippi flood-control work. The Corps of Engineers as a continuing organization plans its work ahead, generally for a number of years. When Congress decides that any particular project from the army engineers' approved list should be undertaken and makes the money available, construction can be started quickly. The country needs much more of such advance planning. Our cities especially should have bureaus in their engineering department sufficiently detached from current problems to permit them to prepare advance plans for a logical development of the city's services. If such planning were the rule rather than the exception, last year's record of non-federal PWA funds put under contract would have been more like that established on the upper Mississippi River work.

Income-Tax Statistics

SOME SOUL-SHAKING STATISTICS have just been made available to us, and they are far more significant than any stirring commencement-day address we have ever heard. The figures have to do with gross income-tax payments made during the past year by various professional groups in Indiana. The income tax in that state is one per cent of gross receipts, with an exemption of $1,000. On that basis, 156 engineers and architects paid an average tax of $38.18. Undertakers and funeral directors paid more, $40.08. Attorneys paid less, $29.52. These are no sterile figures devoid of value in determining a future course of action. Their moral is plain: Lawyers can teach a lot to engineers, architects and undertakers about computing income taxes.

Old House Demolition

TEARING DOWN old dilapidated houses that have long served their usefulness and that long ago entered the obsolescent stage is a problem which municipalities all over the country are attempting to solve today. Aside from the danger to life and limb there is a serious health menace lurking in their multi-cracked surfaces and inadequate sanitary facilities. From the broader aspects of the city as a whole, all too often these old rookeries stand in the way of progress. A survey of almost any city will disclose a ring of blighted areas surrounding the commercial core in which over a period of years the houses have been passed down to lower and lower income classes. During the past few years the owners have received no return at all on thousands of such dwellings and the city has long ceased to obtain income from such districts commensurate with the expense of serving them. Plenty of figures are available to show what luxuries these slums are. A bond issue to wipe them out would pay handsomely, but legal red tape aplenty exists to protect property holders from any encroachment by governmental agencies. In Chicago rat-ridden tumble-down houses are being demolished by consent of the owner with relief labor. It took five long months of consistent effort, as noted on another page, to unwind the red tape to make this possible, but now that the procedure has been perfected many another municipality confronted with the same legal restriction and apathetic attitude of officials may benefit from Chicago's experience. No better use can be made of surplus labor, and no program will enlist more support.

Road Work Ahead

A NEW ORDER in roadbuilding has come with the passage of federal-aid legislation by the last Congress. The actual money aid provided is not greater than had been provided in the years immediately preceding the Recovery Act appropriation of 1933, but in the new law its expenditure is both liberalized and restricted to the advantage of the road taxpayer. A reciprocal obligation now rests on roadbuilding interests to see that the gains are consolidated.

By the new law the limitations on roadbuilding through cities and towns and on cost of road per mile have been removed; a portion of federal funds can be used for surveys and plans, and main parkways are brought into the federal-aid classification. On the other hand, a quarter of the funds must be used on secondary roads, and federal aid is reduced one-third in states that divert motor-vehicle tax money to other than road expenditures in excess of the amounts provided for in the tax laws as now in force. A limit of one instead of two years is set on the time within which states must match federal aid if they are to hold their allotments. As compensation for these limitations the law cancels all remaining debts owed by the states for money borrowed from the $80,000,000 and $120,000,000 federal emergency loans or from RFC funds for which federal-aid was hypothecated.

The amendments and additions of the new law put federal-aid legislation in position for even greater regulatory usefulness to highway development than in the past. Many would have preferred a most positive restriction on motor-vehicle tax diversion, but federal and state administration sympathetic with the intent of the law can in most states largely discourage depredation on the money paid by motorists for highway service. It is the obligation of highway officials and associated roadbuilding interests during the year before the act becomes effective to develop the road-user sentiment to inspire and support vigorous administrative action.

Immediate interest in the work ahead it naturally tied up with the money made available by the new law and the opportunity for its useful expenditure. The quantitative information is reasonably definite. A statistical survey of the forty-eight states made by the Association of State Highway Officials in June disclosed that on the federal-aid system alone contracts could be let in the next two years for meritorious projects to the amount of $1,740,000,000. This estimate should be conclusive evidence that there is no place for the roadbuilding holiday so often being urged by the interests seeking road-tax money for their own financial deficiencies. At its highest total the road money in prospect from federal and state sources amounts to but a fraction of the reasonable requirements for highway improvement.

As computed by the Association of State Highway Officials, the federal and state highway construction funds for the fiscal year just begun, including a remainder of $230,000,000 from the $400,000,000 Recovery Act grant, the new $200,000,000 grant and $175,000,000 of state funds, will amount to $605,000,000. For the succeeding two fiscal years, with straight federal aid, the total will be $300,000,000 a year. This three-year total of $1,205,000,000 is for road construction under federal and state direction. The construction program to be looked forward to by the roadbuilding industries is very definitely fixed for state activity; county and township construction will augment the state activities as financial solvency returns to the local governments.

The review of road work ahead, made possible by the definite action of Congress on federal aid, presents a reasonably liberal program to which the highway industries can look for occupation for the next three years. A return to roadbuilding stability which has not existed since 1930 has been made. These are gains that all the interests that depend upon the highway should organize to protect as earnestly as they have labored to bring about the recent congressional action. But from now their influence has more particularly to be brought to bear on state legislatures and executives who, in considerable numbers during the discouragements of depression years, have shown incapacity in highway administration.

Establishing a Power Policy

AT THE TOP of the technical program of the meeting of engineers at Vancouver last week was the Bonneville federal power project, together with its near neighbor, the Grand Coulee project. The remarkable design and construction features of these projects were discussed in detail. Private discussion, on the other hand, centered on their economic aspects, and great concern was expressed over the absence of a power policy for administering them—indeed the lack of any provision for formulating such policy. Is the nation creating for itself other Muscle Shoals plants to be the long-time sport of politics and to paralyze the initiative of a whole region? This thought was foremost in the mind of every engineer as it has been in the mind of every thoughtful layman who has seen the works going forward with no definite purpose as to their utilization.

As if in answer to this inquiry comes the White House announcement on July 15 of the appointment of a National Power Policy Committee headed by Secretary Ickes, to "develop a plan for the closer cooperation of the several factors in our electrical power supply—both public and private—whereby national policy in power matters may be unified and electricity be made more broadly available at cheaper rates to industry, to domestic and particularly to agricultural consumers."

Such a body has been needed ever since the Administration launched its great power-development program. As part of that program we now have the Tennessee Valley Authority, the Bureau of Reclamation and the Corps of Engineers all developing power or building power plants, the Mississippi Valley Committee making plans for power development and both the Federal Power Commission and the Federal Trade Commission making studies of power rates. As long as fundamental doubt remains whether the very large blocks of power now being developed by the federal government will be forced on an already saturated market, whether it will be distributed on a true and fair basis of cost, and whether the federal projects will compete or are to be coordinated with existing private plants, these power developments are likely to be a brake on business revival and to becloud the brilliant picture of great construction operations. Early action by the committee, therefore, is highly desirable in order to end the present uncertainty. Further, unless confusion is to develop, the policy determined upon must be given the force of law by Congress, not left to the caprice of the directors of independent agencies like the TVA to be changed at will.

CURRENT NEWS

Entire PWA Fund of $3,700,000,000 Has Been Distributed

AS a result of allotments for non-federal and federal projects announced by the PWA during the past few weeks the entire $3,700,000,000 fund is virtually depleted. Allotments in excess of $100,000,000, just announced, to continue federal projects during the second year of construction, as noted in another column on this page, have reduced the balance of the available fund to the vanishing point.

At the present time the actual construction program made possible by PWA financing which began last year is rapidly accelerating to a peak. Recently there have been marked increases in the volume of PWA construction and the number of persons employed.

With most of the $400,000,000 allotted by President Roosevelt to the Public Works Administration out of the last deficiency act already allocated, Administrator Ickes is planning to confer this week with RFC officials for the purpose of obtaining additional funds through an exchange of securities now held by the PWA. Under the deficiency act approved June 19, the RFC is authorized to purchase marketable securities from the PWA up to a maximum of $250,000,000, at any one time. The money thus secured would be available to the PWA for making additional loans, but not grants, under the public works title of the National Recovery Act.

Los Angeles to Build Debris Dam to Protect Montrose Area

The Los Angeles county board of supervisors has provided $110,000 in its new budget to make possible, before the coming of the fall rains, the construction of the Brand Park debris basin to protect the Montrose-La Crescenta area against floods. The proposed debris basin would be constructed in the canyon back of the Montrose-La Crescenta area in such a way as to catch and hold soil and rocks washing down from the mountainsides. In the flood of January, 1934 (*ENR*, Jan. 11, 1934, p. 51) portions of this district were covered to a depth of several feet by earth and rocks washed down from the hills.

New Jersey Water Board Revived to Consolidate Water Studies

The Water Policy Commission of New Jersey has been revived by Governor Moore after a period of inactivity enforced by lack of funds in order to study and report upon the consolidation of all the water supply and sewage disposal commissions of the state into one or two state commissions which will be able to work toward a more comprehensive development of the state's water resources than is possible with the present regional bodies.

Housing Modernization Drive to Begin August 15

Washington Correspondence

A three-way promotion campaign, to begin Aug. 15, is planned to put the home modernization program over. It will be aimed at those who have money to lend, those who have materials to sell and at the home owners who would borrow the money to buy the material. In this house-that-Jack-built technique, there is no suggestion of ballyhoo. Campaigning will be limited to communities where it will be welcomed and abetted by local leadership.

With the appointment of Albert L. Deane as deputy in charge of the modernization program, the campaign will soon be ready to go. President of the General Motors Holding Corp., Mr. Deane has been one of the keymen in pushing the administration's housing program.

Administrator Moffett is looking forward to a real selling campaign in which all industries will benefit by the churning up of private funds. He sees possibilities in industrial renovation paralleling the home modernization program, although not a part of it.

The new lumber price schedules primarily intended to stimulate the housing program were approved by NRA during the week. The eight to ten per cent reductions permitted in minimum mill prices together with previous reduction in model markup for retail dealers will save consumers between 14 and 15 percent, it is claimed. Under the new schedules hardwoods are not reduced as much as soft woods because a comparatively small quantity is used in home building. Woodwork products are being reduced at least as much as lumber. John D. Tennant, chairman of the Lumber Code Authority, says price cut entails great sacrifice by operators already selling at less than cost on present volume but their hope is that demand for home building will justify new prices.

Structural Steel Erection is Under Construction Code

ON July 11, General Johnson approved on behalf of the President, Code Number 480 for the Structural Steel and Iron Fabricating Industry, but in doing so he made extensive changes in the code as presented to him. The most important of these changes is the deletion of all provisions governing erection work, and the placing of such work under the provisions of Chapter I of the Construction Code. Thus after months of negotiation, the structural steel controversy has been terminated by an executive order officially separating fabrication and erection.

Sponsored by the American Institute of Steel Construction the structural steel code has passed through many hands at NRA since its first public hearing Oct. 20, 1933. As originally submitted, the code proposed to govern fabrication and erection by the fabricators, with independent erectors permitted to sign and assent to the code. At one time, a special committee was appointed to advise the divisional administrator as to the possibilities of tying in erection with the construction code, but this move was unsuccessful. Throughout union labor has held out for a separation of fabrication and erection.

As now modified, the code covers fabricating and selling fabricated steel or iron shapes, plates or bars (other than concrete reinforcing bars) for use in construction of buildings, bridges or other structures. It becomes effective July 22. A straight 40-hr week and 8-hr. day is stipulated, with the usual exceptions for employees engaged in emergency work, persons employed in a managerial or executive capacity, and watchmen. A sub-paragraph added by the executive order provides that no employee

(Continued on page 94)

PWA Allots $99,470,000 for Continuing Large Federal Construction Projects

ADMINISTRATOR Ickes has announced allotments totalling nearly $100,000,000 from the PWA fund to carry forward construction operations on many of the large-scale federal projects for the coming year. This money does not provide for the start of new projects and is to permit continuing developments which have already been started. Several have previously been described in *Engineering News-Record*.

The continuation allotments announced are:

Mississippi River:	
Locks and dams	$17,000,000
Dikes and revetments	1,000,000
Fort Peck dam and reservoir	25,000,000
Bonneville dam and power plant	11,000,000
All-American canal	3,000,000
Missouri River control (mouth to Sioux City)	16,736,000
Rio Grande River rectification and flood control	1,000,000
Lake Okeechobee, Fla.	3,700,000
Great Smoky National Parkway	2,000,000
Tygart dam	7,000,000
St. Clair River improvement	1,960,000
Cleveland, Ohio, Harbor	150,000
Indiana Harbor, Gary, Ind.	700,000
Houston ship canal	1,043,000
Indian irrigation projects, Montana	165,000
Owyhee project, Oregon	1,500,000
Cape Fear River, North Carolina, channel protection	650,000
Boston Harbor, dredging	250,000
Cape Cod Canal, dredging	1,000,000
New Haven harbor, dredging	100,000
Hudson River channel, New York, channel widening	155,000
Raritan River, cut-off channel	324,000
New York-New Jersey channels, dredging	347,000
Delaware River, dredging	750,000
Ohio River, channel work	500,000
Allegheny River, locks	240,000
Kanawha River, locks	2,200,000
Total	$99,470,000

Henry M. Waite to Retire From PWA In September

COL. HENRY M. WAITE has resigned as Deputy Administrator of Public Works effective Sept. 1. His successor has not been selected. His resignation was announced with regret by Administrator Ickes who praised the Colonel for his "splendid contribution to the recovery program."

Colonel Waite will return to Cincinnati where he will take charge of the Department of Economic Security, an organization designed to cope with unemployment and rehabilitation problems, sponsored by the City of Cincinnati, Hamilton County, Ohio, and the Spellman Foundation.

Secretary Ickes said: "At his own request and greatly to my regret, Colonel Waite is leaving the PWA organization after Sept. 1 to accept an important post in Cincinnati which has been seeking his assistance for months. As deputy administrator of public works Colonel Waite has devoted his brains and fine courage to the tremendous and at times almost insoluble problems that PWA has faced. Our success in meeting these obstacles has in a great measure been due to wise counsel and untiring efforts of Colonel Waite. He has the satisfaction of knowing that once again he has performed a service to his country. Colonel Waite has made a splendid contribution to the recovery program.

"I also feel a distinct personal loss in the Colonel's retirement from the PWA. His charming personality, keen wit and happy faculty for friendship will be greatly missed in Washington. To me he not only proved himself a capable assistant but endeared himself as a friend as well. I wish him every success."

Colonel Waite was appointed deputy administrator a few days after Secretary Ickes had been designated by the President as Administrator. He was not known to the Administrator personally, but his record as engineer was well known.

Following the announcement of his resignation, Colonel Waite said:

"The organization and development of the PWA has been one of the most important and interesting undertakings with which I have ever been connected. It is one of the most unique in make-up, diversification and magnitude of accomplishment in the history of the country. The results speak for themselves. It is, I believe the backbone of the recovery program.

"After having spent more than a year as deputy administrator in this organization it is perfectly clear to my mind that for some years to come a public works program will be absolutely essential to care for the unemployment situation. This fact is well recognized by the administration in the setting up of a board to think in terms of future planning for the United States.

"It is with sincere regret that I feel I must leave this important work as well as say good-bye to the faithful members of the PWA staff. The experience has been one of hard work, but it is gratifying to feel the cooperation that has been rendered by my associates in the PWA as well as the support I have always received from Administrator Ickes."

Commenting on his new work, Colonel Waite continued: "For some years there has been intelligent interest throughout the country in the necessity for a careful analysis and planning of our present unemployment situation. Partial experiments have been carried on in two or three cities, with the result and determination now to set up a complete analysis and plan. For these purposes, Cincinnati and Hamilton County, Ohio, have been selected as the ideal spot to make such a study. It will cover not only unemployment but rehabilitation and the cooperation of industry in Cincinnati, to determine through analysis the best plan to follow in solving this most important question before the United States today."

Activated Sludge Suit Taken to U. S. Supreme Court

Suit has been filed in the U. S. Supreme Court by the City of Milwaukee, challenging the validity of patents of the Activated Sludge, Inc. Milwaukee is asking a review from the decision of the seventh circuit court of appeals which sustained the patents and held them infringed in the $9,000,000 sewage disposal plant in that city.

San Francisco Bridge Under Way One Year and Ahead of Schedule

On July 9 the San Francisco-Oakland Bridge project celebrated its first anniversary since the beginning of construction operations. During the year the contractors have earned $11,500,000 or 31 per cent of the total amount of major contracts, and the construction program is estimated to be more than six months ahead of original schedule, according to C. H. Purcell, chief engineer.

The steel tower at pier 2 is practically completed, with a small amount of steel still to be erected and riveting about half finished. The beginning of steel erection at pier 3 is scheduled to start this week. Work on the Yerba Buena tunnel is being advanced by two pioneer headings; the south heading is 450 ft. in from the west portal and the north heading is in 400 ft.

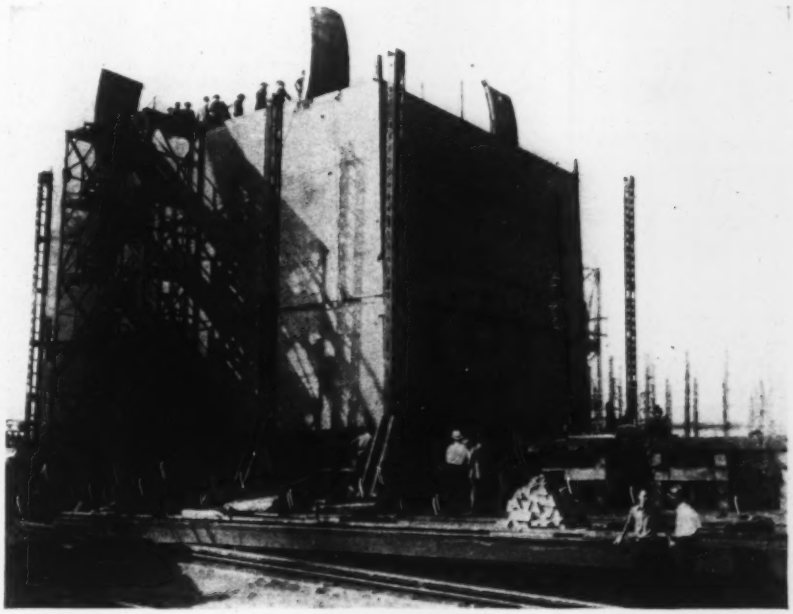
On the east side of the island, pier E-3 is down 185 ft. below water surface and construction is well advanced on all except one of the other east channel piers.

Reports indicate that bridge construction work, particularly on the San Francisco side, was shut down on Monday as a result of the general strike.

LAUNCHING VENTILATION SHAFT CAISSON FOR HUDSON TUNNEL

On July 17 the lower section of the steel caisson for the river ventilation shaft of the Midtown Hudson Tunnel in New York was floated up the Hudson River to its location just west of the bulkhead wall at the foot of West 39th St. Fabricated at the plant of the Federal Shipbuilding & Dry Dock Co. on the Hackensack River, the caisson is about 52x42 ft. in plan with side walls 30 ft. high, which will later be extended to 100 ft., to permit the cutting edge to come to bearing on rock at 98 ft. below mean high water. The caisson is built entirely of steel, with double walls between which the concrete will be placed during sinking.

As stated in an article describing the tunnel (*ENR*, March 8, 1934, p. 313), tunnel driving will be carried out from construction shafts on the New York and New Jersey sides of the river. Thus the tunnel will be driven through the caisson, whose sinking is just beginning. Special provisions have been made in the caisson for this operation. When the caisson is sunk to rock and sealed, the roof of the working chamber will be removed and raised to a higher position immediately above two large circular bulkheads provided in the east and west faces of the caisson. Compressed air can then be pumped into the enlarged working chamber while these bulkheads are burned out to permit connecting the cast iron rings of the tunnel to the caisson. Construction of the shield-driven tunnel and the shafts is being done by Mason & Hanger Co., Inc., under contract with the Port of New York Authority. The American Bridge Co. fabricated the steel caisson.



New York Highway Contractors Request Investigation of State Insurance Office

HIGHWAY contractors of New York state have asked the governor for an investigation, either executive or legislative, of the state insurance department, it was disclosed July 14 when a letter to the governor by Harry R. Hayes, managing director of the state chapter of the A.G.C. was made public. The highway contractors are aroused over the "increases ranging from 17 to 56 per cent" in premium rates on workmen's compensation insurance for the construction industry. These new rates became effective July 1. According to Mr. Hayes the demand for an investigation of the department follows unsuccessful efforts by the contractors to obtain a hearing from the state superintendent of insurance.

The letter to Governor Lehman says in part:

"Classifications applying to the construction industry show increases ranging from approximately 17 to 56 per cent. The new rates indicate an average of approximately 30 per cent increase for all construction operations. This industry regards this latest increase as a serious matter, since it arbitrarily places an additional burden on the construction industry of about $1,000,000 a year. We note that the construction industry represents about 23 per cent of all industry and we are at a loss to understand why the construction industry should be subjected to a 30 per cent increase in rates whereas the new rates for other branches of industry show approximately an 8 per cent increase for manufacturing and a 2.7 per cent increase for other miscellaneous lines.

"This latest drastic increase in premium rates on construction represents the fourth major increase which has been granted the underwriters during the past three years. Compensation premium rates have been mounting rapidly in New York state during the past several years. In many of the classifications the rate is now more than double that obtaining in adjoining states. This subject has been a matter of consideration to our industry in New York state during the past several years and during the latter part of 1932 we vigorously urged that the state conduct an investigation of the whole rate-making procedure. Up to the present time nothing has been done and in view of the latest increase, which is the fourth since January, 1931, there devolves an additional burden of $1,000,000 a year on the contractor group and we believe the subject unquestionably warrants an exhaustive investigation either under your direction or under legislative auspices."

The governor has not indicated what action, if any, he will take as the result of this appeal for an investigation.

International Road Congress to Hold Seventh Meeting

On the initiative of the German government the Seventh International Road Congress will be held in Munich, Sept. 3-8, with the object of continuing the studies begun at Paris in 1908 and pursued at Brussels in 1910, London in 1913, Seville in 1923, Milan in 1926 and Washington, D. C., in 1930.

The first section of the meeting will be devoted to construction and maintenance, including cement, tar, bitumen and emulsions, and the second section will cover use and administration including such topics as: traffic in towns, open country and grade crossings, regulation of signs and weight and size of vehicles.

Opposition to Dealer Sales Voiced at Cement Code Hearing

In the NRA hearing July 11 on proposed amendments to the cement code, with particular reference to reinstating Article XI on marketing methods, suspended since last January, principal discussion centered on the section which states that "except as otherwise specified, cement shall be marketed in each community through the dealers regularly serving such community." Opposition to this provision was voiced by representatives of the ready-mixed-concrete industry, of the A.G.C. and of the U. S. Conference of Mayors. It was contended that the provision permitted dealers to monopolize the cement business and raised the cost of construction unnecessarily. Stanton Walker, executive officer of the Ready-Mixed-Concrete Code Authority stated that "it is just as unfair to lay down these requirements as to tell the baker that he must buy his flour from the corner grocery store." It was also contended that those ready-mixed-concrete companies who also act as cement dealers would have a substantial competitive advantage over other ready-mixed-concrete companies. Municipal representatives asked that amendments be added placing municipalities on a par with state and federal governments, which are permitted to purchase direct from the manufacturer.

The hearing was adjourned until July 25 at which time it may be reconvened by the NRA if additional information is needed before a decision on the amendments can be rendered.

PWA Turns Attention to Housing in New York and Chicago

Announcement of the appointment of Dwight L. Hoopingarner and F. J. C. Dresser as associate directors (advisory) of the PWA Housing Division brings out the news that attention is being turned to large-scale slum clearance plans for New York and Chicago, federal efforts heretofore having been concentrated in Atlanta and Cleveland. Mr. Hoopingarner and Mr. Dresser will aid Horatio B. Hackett, director of housing, who will continue in charge of the housing division and the Public Works Emergency Housing Corporation.

Mr. Hoopingarner's first work will be in New York as representative of the PWA Housing Division for the New York housing program, for which $25,000,000 has been tentatively allocated. Mr. Dresser will visit Chicago as representative of the housing division for the Chicago housing program, for which PWA also has tentatively allotted $25,000,000.

In New York, Mr. Hoopingarner will work out a plan for cooperation between the PWA Housing Division and the New York Housing Authority. As representative of the housing division in Chicago, Mr. Dresser will review sites, study values, and make recommendations on the extent and type of the program.

Formerly of Cleveland, Mr. Dresser has a wide background of engineering experience and has served on many public and semi-public commissions. Mr. Hoppingarner for the last 12 years has been executive head of the American Construction Council of New York.

LONG TRESTLE ACROSS MISSOURI RIVER AT FORT PECK PROJECT

To provide access to the far side of the Fort Peck dam site, on the Missouri River in eastern Montana, a pile trestle has been constructed which will be used by both railroad trains and trucks to reach the present work on the diversion tunnels. The trestle is located at the downstream toe of the dam. A steel truss span will cross the main channel, to permit moving of the dredges and barges to the borrow pits which will provide the material for the hydraulic fill.

Federal Power Policy To Be Formulated By New Committee

ORGANIZATION of a National Power Policy Committee in the Public Works Administration, at the request of President Roosevelt, got under way July 18. The committee is composed of Harold L. Ickes, Secretary of the Interior; Elwood Mead, chief of the Bureau of Reclamation; Frank R. McNinch, chairman of the Federal Power Commission; Morris L. Cooke, of the PWA Mississippi Valley Committee; Maj. Gen. Edward A. Markham, Chief of Engineers, U. S. Army; Robert E. Healy, of the Federal Stock Exchange Commission; David Lilienthal of the Tennessee Valley Authority; and T. W. Norcross, Assistant Forester of the Forest Service.

The establishment of the committee was announced by the White House in an executive letter on July 16. Secretary Ickes had urged that the President take such action before the Chief Executive left on his vacation trip to Hawaii.

President Roosevelt declared that it will be the duty of the committee to "develop a plan for the closer cooperation of the several factors in our electrical power supply—both public and private—whereby national policy in power matters may be unified and electricity be made more broadly available at cheaper rates to industry, to domestic and, particularly, to agricultural consumers."

Data already compiled by various agencies of the government is to be reviewed by the committee's staff, which will be composed of PWA technicians and lawyers, and supplemental information will be collected if it is thought necessary. It is understood that the committee plans to hold no public hearings.

In his letter establishing the committee, President Roosevelt explained that it was not to be a mere fact finding body, but rather one for development and unification of national power policy acting in an advisory capacity to the President. "As time goes on there undoubtedly will be legislation on the subject of holding companies and for the regulation of electric current in interstate commerce," the letter read. "This committee should consider what lines should be followed in shaping up this legislation. Since a number of the states have commissions having jurisdiction over intrastate power matters, it is necessary that whatever plan is developed should have regard to the powers of these various state commissions as well as of the states in general."

Steel Construction Institute Lends Support to Model Tests

Arrangements have been completed by the American Institute of Steel Construction with Ohio State University to complete the first series of tests that have been started at that institution with a steel model of a windbraced three-panel bent. The work will be carried on at the Engineering Experiment Station of the university during this summer and the next year, following which an analysis and report will be made to the Institute. The tests will be under the direction of Professor Clyde T. Morris and George E. Large.

Knoxville Electric Plants Go to TVA for $6,088,000

Agreement was reached July 17 between TVA and the Tennessee Public Service Co., the subsidiary of National Power & Light Co., that supplies Knoxville, Tenn., with electric power, for TVA to purchase the company's electric properties in eastern Tennessee for $6,088,000. The purchase price does not include a transmission line connecting with the Carolina Power & Light Co., hydro plant on the Pigeon River. According to David E. Lilienthal, power director of TVA, the agreement is contingent upon the bond holders turning in their bonds at a price of 96½, the issued price, within three weeks. Should the company be unable to get the bonds at that price the agreement will be rescinded and Knoxville will proceed to build its own electric facilities.

Knoxville is the first large city to be entered by TVA. However, last week, Mr. Lillienthal announced a program of furnishing power to 13 towns and cities in northern Alabama which had requested service. The Authority will exercise options now held on the properties of the Alabama Power Co. "Thereupon a petition will be filed with the Alabama Public Service Commission requesting its approval of the transfer of these distribution facilities from the power company to the TVA. This approval is necessary before transfer can be effected. With such approval of the commission, and a transfer of title, Muscle Shoals power will be available to homes, farms and industries in these counties without further delay.

"The prompt action of the municipalities of northern Alabama cooperating with the TVA in this manner is further evidence that the people of Alabama are solidly behind the President's program."

French Broad River Dam

Preliminary studies have been made for a dam and power development on the French Broad River near Asheville, N. C., according to Carl A. Bock, assistant chief engineer of the TVA, in line with many requests for the development at this site. However, although the topography of the site affords a natural reservoir basin, the estimated cost of power which could be produced is far in excess of the cost of power from other locations, and the TVA has concluded that the construction of a dam at this site is not economically justified at the present time.

Extensive Water Power Surveys Start in Province of Quebec

The Quebec Streams Commission, the official water conservancy organization of the Province of Quebec, is arranging to have three large survey parties at work in different parts of the province during the present summer, in addition to the regular field parties on routine work. One party will explore water-power possibilities in the Lake Chibougamao district, above Lake St. John; a second party will do similar work on the Harricana River, flowing into Hudson Bay in the Abitibi district. The third party, consisting of at least thirty engineers and staff, will be engaged in survey work on the head waters of the Rimouski River, on the south shore of the St. Lawrence River, to investigate a possible reservoir site for future river regulation.

Work to Start on the Mono Basin Project To Augment Los Angeles Water Supply

CONSTRUCTION work on the Mono Basin water project of the Los Angeles, Calif., Department of Water and Power, funds for which were provided in the $38,800,000 bond issue of 1930, is to be started during July, according to H. A. Van Norman, chief engineer and general manager of the bureau of water works and supply. The board of water and power commissioners on July 3 authorized him to proceed with the work. Mr. Van Norman stated that 800 men would be required for the preliminary work and that 700 men would be used during the permanent construction period. The project will augment the supply of the Owens Valley aqueduct by tapping another water-shed area by a 13-mile tunnel.

It is estimated by the water bureau engineering department that the construction work to be undertaken, which lies north of the proposed Long Valley reservoir, will cost $7,500,000 and will require at least three years to complete. It is considered likely that work on the Long Valley reservoir might be started before completion of the Mono Basin work.

Preliminary work on the project will include the building of four construction camps at the portals of the Mono Craters tunnel and two shaft sites, the building of power and telephone lines, water supply lines and many miles of roads and trails. With this preliminary work done, work will begin on the driving of the thirteen-mile tunnel under the Mono Craters which will bring the water from Mono Basin into the Owens River at Thompson's Crossing.

The tunnel will be 10 ft. in diameter and will be lined with concrete. The tunnel capacity will be 350 sec.ft. In addition to the tunnel, the next large unit in the construction program will be the building of the Grant Lake reservoir and a conduit that will pick up the water from Lee Vining, Parker, Walker and Ruch creeks and bring it into the tunnel.

Financing

Immediate finances for the Mono Basin project will come from a $2,000,000 block of water bonds sold recently. It is hoped by the department that a Federal loan may be negotiated when more money is required.

The Mono Basin project, according to Mr. Van Norman, will yield an average water crop of 138 sec.ft. during dry years, with an expectant average yield of 225 sec.ft., counting dry and wet years together. The entire Mono project, including the purchase of the water rights and properties of the Southern Sierras Power Co., building of the Long Valley dam and other works to divert all of the waters of the Mono Basin into the Owens River and the Los Angeles aqueduct, will cost about $13,000,000.

Structural Steel Erection Placed Under Construction Code

(Continued from p. 90)

engaged in drafting, detailing or designing shall be paid in any pay period less than at the rate of $20 per week. Minimum hourly rates for common labor range from 34c. per hr. in the southern states to 40c. per hr. in the northern states. For other than common labor (except plant superintendents) the minimum rate of pay is placed at 150 per cent of the minimum rates of pay for common labor, with a basic minimum in no case of less than 51c. per hr.

The code establishes penalties for violation of any labor provisions in an amount equal to $3 per ton for each ton of any product which shall have been fabricated during the continuance of its violation. Similar penalties, varying in amount, were prescribed for various other violations of the code. Members of the industry are prohibited from selling any product at a price less than the reasonable estimated cost to such member of such product. On written complaint, investigations may be made as to whether any member of the industry has bid below a reasonable estimated cost. If the determination is in the affirmative, the code authority is required to certify the facts in respect thereto to the Administrator, and also is empowered to require such member to pay into the treasury of the code authority as liquidated damages such sum as the code authority shall fix, but in no case exceeding twice the difference between the price quoted and the reasonable estimated cost as determined by the code authority.

A member of the industry is required to file a duplicate copy of its lowest bid with the secretary of the Institute, who shall open it after the definite award of a contract; and if more than one bid or agreed price for such work has been received, furnish a tabulation of bids to those bidding.

In sub-letting to any member of the construction industry any incidental erection work, members of the industry are required to comply with the competitive bidding practices contained in Schedule G which incorporates, almost verbatim, Sections 1 to 12 of Article VII of Chapter I of the construction code.

Terrazzo division approved

On July 13 the Administrator approved an additional chapter to the construction industry code, Chapter XV, Terrazzo and Mosaic Contracting Division. This chapter does not differ materially from other approved chapters of the code, except that normal work is limited to 136 hours in any calendar month, which is equivalent to approximately 32 hours per week. It marks the agreement of employers of this division to spread employment. The volume of work in this division is reported at $16,000,000 in 1930, but only $5,000,000 in 1933. Employment for the two dates dropped from 8,000 to 2,000.

Elevator division budget

On July 14 the budget and basis of assessment for the Elevator Manufacturing Division of the Construction Industry was provisionally approved. The budget totals $58,000 for the 12-month period beginning March 31, 1934; and the basis of contribution is 1/5 of 1% of gross sales billed.

PWA Reports Rapid Acceleration in the Number of Projects Reaching Contract Stage

AN accelerating upswing in the volume of PWA-financed public construction projects which are reaching the contract stage, calling for actual expenditures for labor and material, is reported for the first six months of this year, according to figures released by Administrator Ickes. On January 1, $890,000,000 worth of both federal and non-federal projects were under construction, under contract or completed, and on July 1, $1,700,000,000 worth of projects had been rushed forward into those three stages, indicating a rise of more than 91 per cent for the last six months, during which the PWA has exerted every effort to get projects started.

The $1,700,000,000 worth of projects now in contract, construction or completion stages, will shortly be augmented by another $158,000,000 worth of projects for which bids are now being advertised.

Actual expenditures for materials and wages of men employed directly on construction sites have increased rapidly in recent weeks. For the first week in April, these real expenditures were about $16,000,000, and by the end of June, this figure had increased to more than $30,000,000 a week. Further, for the week ending June 30, the PWA employment, including only men directly employed at construction sites, had risen to 588,000, which is double the number employed in the first week in April. It is estimated that the employment provided in producing and processing industries adds two men for each one directly employed at the job site.

The allotments of PWA funds made during the past week have been concentrated on large federal projects and there have been no substantial increases in the non-federal PWA financing.

Two weeks ago, however, the PWA released about 1,250 allotments for non-federal construction projects in announcements made on five consecutive days. A part of these 1,250 allotments appeared in the extensive tabulation in last week's issue, p. 62, and another installment is contained in the following tabulation:

KEY TO SYMBOLS

*-grant only
m-meters
p-pumps
t-tank or standpipe
f-filtration
d-distr. supt.
w-well
s-supply
g-generator
ch-chlorinators
e-canal
dm-dam
r-reservoir
t-treatment plant
b-building
i-iron removal
pw-power line
sf-softening
bl-boilers

Waterworks

Abbott, Tex., **t**	$4,000
Addison Co., Vt., **s-dm-t-ch**	156,000
Alamogordo, N. M., (N. M. Inst. for the Blind)	9,000
Albuquerque, N. M., **d**	6,700
Albuquerque, N. M., **d**	11,000
Albuquerque, N. M., **d**	22,000
Albuquerque, N. M., **d**	53,000
Alma, Nebr., **w-p-d**	7,500*
Angola, N. Y., **s-p-f-t**	50,000
Anna, Tex., **t-d**	22,000
Arkansas Pass, Tex., **d** (also sewers)	37,000
Athens, Tex., **p-m-t-r-d** (also sewers and treatment plant)	90,000
Atwood, Ill., **w-p-t-d**	43,000
Aurora, Ill., **w-t-r-p-d**	455,000
Austin, Tex., **d**	160,000
Avery, Tex., **w-bl-t-d**	22,000
Avon, N. Y., **d**	8,000
Baltimore, Ohio, **w-p-t-sf-d**	57,000
Balt, Mont., **d-p**	10,000
Barton, Vt., **f**	15,000
Basil, Ohio, **d**	32,000
Bayonne, Hudson Co., N. J., **s**	600,000
Bazine, Kans., **w-p-t-d**	
Benld, Ill., **s-p-t-d**	
Bentonville, Ark., **s-p-r-ch-d**	
Beresford, S. D., **st-f**	
Bethlehem, N. Y., **d-r**	
Big Sandy, Tex., **w-p-t-d**	
Big Timber, Mont., **s-r-d**	
Bland, Mo., **w-p-t-d**	
Bloomfield, N. J., **d**	
Bolivar, Mo., **t-d**	
Bradford, Il., **w-p-s**	
Brawley, Calif., **f-t-d**	
Bridger, Mont., **s-p-r-d**	
Brownwood, Tex., **d**	
Buchanan, N. Y., **d**	
Burgaw, N. C., **w-p-t-d**	
Burley, Idaho, **d-w-p**	
Burrillville, R. I., **w-p-t-d-bl**	
Bushnell, Ill., **d**	
Byesville, Ohio, **w-p-bl-t-d**	
Byron, Minn., **w-p-t-d**	
Caliente, Nev., **d-p** (also sewers and sewage plant)	
Carbon Co., Utah, **d**	
Cardington, Ohio, **w-p-t-d**	
Carrizo Springs, Tex., **w-p-d**	
Castleberry, Ala., **w-p-t-d**	
Cedar, Utah, **s-d-r**	
Centerville, Mich., **w-p-t-d**	
Centerville, Utah, **d**	
Charleston, Ill.	
Charlotte, N. C., **d** (also sewers)	
Chester, N. J., **w-p-t-d**	
Clarks Fork, Bonner Co., Idaho, **dm-s**	
Clifton, Idaho, **d**	
Coalville City, Utah, **r-d**	
Cobleskill, N. Y., **dm-s**	
Colchester, Ill., **p-f-t-d**	
Collinsville, Ill., **w-p-d**	
Cook County, Ill., **r-p**	
Crotty, Ill., **r-f**	
Crystal City, Tex.	
Dallas, Tex., **f-d**	
Dawson, Tex., **dm-p-m** (also electric trans. line and dist syst.)	
Decatur, Ill., **bl** and other plant power impvts.	
Deming, N. M., **t-r-d**	
Des Plaines, Ill., **t-d**	
Dodsonville, Tex., **w-p-t-d**	
Drakesboro, Ky., **w-p-r-t-d**	
Duncombe, Iowa, **t**	
Durand, Wisc., **w-p-r-d**	
Eden, Idaho, **p-d**	
Eden, N. Y., **w-p-t-d**	
Ekalaka, Carter Co., Mont., **w-p-t-d**	
Elberta, Mich., **w-p-t-d**	
Elkhart, Tex., (also sewers and disposal plant)	
Elyria, Ohio, **s-d**	
Eureka, Calif., **dm-tl-r-s**	
Eureka, Mont., **d**	
Fairfield, Tex., **w-p-r-t-d** (also sewers and sewage plant)	
Fairhope, Ala., **w-pn-t-tr-d**	
Fairview, Mont., **w-p-t-d**	
Fairview, Utah (also hydro-electric plant)	
Florham Park, N. J., **p-t-d**	
Fort Collins, Colo., **d**	
Ft. Scott, Kans., **f-p-t**	
Ft. Sumner, N. M., **w-p-d**	
Frederic, Wisc., **d-p**	
Freedom, Okla.	
Garfield Co., Utah, **s-d-m**	
Glasgow, Mont.	
Glasgow, W. Va., **t-d**	
Glendive, Mont., **f-w-p**	
Glen Rock, Bergen Co., N. J., **w-p-r-d**	
Goose Creek, Tex., **d** (also sewers)	
Grayling, Mich., **w-p-t-d**	
Greenfield, Ill., **w-p-t-d**	
Griffing Park, Tex., **d**	
Gunnison City, Utah, **d**	
Guthrie Center, Iowa, **d-t-i**	
Haleyville, Ala., **d-m**	
Hamburg, N. Y., **w**	
Hayti, Mo., **w-p-tr-d**	
Hemp, N. Car., **w-p-t-d** (also sewers and disposal plant)	
Hetland, S. D., **w-p**	
Heyworth, Ill., **w-p-t-d**	
Hickory, N. C., **f** (also sewage treatment)	
Homedale, Idaho, **w-p-t-d**	
Hughes Springs, Tex., **w-p-t-d** (also sewers and disposal plant)	
Humacao, Puerto Rico, **s-ch** (also school buildings)	
Llabel, Okla., **s-p-t-d**	
Independence, Kan., **g-p** (electric distribution)	
Interior, S. D., **s-w-p-d**	
Iron Co., Utah, **w-r-s-d** (also hydro-elect. plant impvts.)	
Jackson, Nebr., **w-p-d**	
Jackson, Tenn., **r-m** (also sewers)	
Jefferson Parish, La.	
Kane Co., Utah, **d-ch**	
Koosharem Town, Utah, **d**	
Laurel, Miss., **t-d**	
Layton, Utah, **d**	
Lehi City, Utah, **d**	
Lincoln, Ala., **w-p-ch-t-d**	
Lindale, Tex., **p-t-d**	
Logansport, La., **w-p-r-t-d**	
Ludlow, Vt.	

Magdalena, N. M., w-p-d-m	59,000
Mansfield, Ark., dm-s-r-p-f-d	56,000
Marathon, Wis., w-p-t-d	15,500*
Marion, Wis., w-p-t-d	62,000
Marquez, Tex., w-p-t-d	26,000
Matewan, W. Va., f-d (also sewers)	55,000
Matoaka, W. Va., w-p-t-d	55,000
Media, Pa., dm-f-p (also highway and sewer)	190,000
Memphis, Mo., f	12,000
Milford, Utah, t-d-m	20,000
Miller, Mo., w-p-t-d	38,000
Monroe, Utah, d-r	42,000
Monterey, Tenn.	67,000
Morgan, Tex., p-t-d	16,000
Mt. Pleasant, N. Y., d-b	20,000
Murfreesboro, N. C. (purchase and reconstruction)	58,000
Nashville, Tenn., d	300,000
New Brunswick, N. J., f-p-r	255,000
Oak City, Utah, s	9,200
Oakley, Utah, s-r-d	20,000
Paris, Mo., t-s	3,400*
Pecos City, Tex., w-p-r (also elect. trans. & dist. syst.)	300,000
Peebles, Ohio, w-p-t-d	55,000
Pender, Nebr., t	2,300*
Pendleton, S. C., s-p-f-t-d	52,000
Pinewood, S. C., w-p-t-d	24,000
Plentywood, Mont., d	10,000
Plymouth, Utah, s-r-d	15,000
Porter, N. Y., w-p-t-d	51,000
Poth, Tex., w-p-r-d	33,000
Prescott, Ariz., dm-s	83,000
Raceland, Ky., t-p-d-m	35,000
Racine, Wis., f-bl-d	300,000
Ramsey, N. J., r	2,700*
Rapid City, S. D., s-w-p-dm	382,000
Rich Co., Utah, s-r-d	20,000
Richfield, Utah, d	116,000
Richlands, N. C., w-p-ch-t-d	31,000
Roanoke, Tex., w-p-t-d	24,000
Roseville, Calif.	55,000*
Rusk, Tex., t-d-p (also sewers)	35,000
Russell, Minn., s-p-r-t-d	32,000
St. Charles, Mo., tr-f	65,000
St. Elmo, Ill., r-tr-d	65,000
Sanders Co., Nebr., w-p-d	13,000
Sandersville, Washington Co., Ga., w-p-f-g	32,800*
Sandpoint, Idaho, s-d	68,000
Sanitorium, N. C., t (N. Car. Sanitorium)	5,000*
Savoy, Tex., w-p-r-t-d	21,000
Saybrook, Ill., w-p-t-d	39,000*
Sayreville, Middlesex Co., N. J., w-p-tr-r-d	48,000
Seymour, Wis., w-p-t-d	110,000
Sharon Springs, N. Y., f-p-t-d	40,000
Shawnee, Okla., dm-s-p	750,000
Silver City, N. M., d-r	30,000
Soldier Summit, Wasatch Co., Utah, s	30,000
Somerville, Mass., d	15,000*
South Coffeyville, Okla., s-d	24,000
Sparta, Ill., dm-f	73,000
Spring City, Utah, r-s-d	63,000
State of N. J. (North Jersey Tr. Sch.) p-bl-t	17,000
Steeleville, Ill., w-p-t-d	40,000
Sterling, Utah, r-ch-d	11,500
Stevensville, Mont., d	55,000
Streetman, Tex., s-f-p-t-d	36,000
Thorndale Tex., w	19,000
Tomahawk, Wis., 456m	2,400*
Tomkinsville, Ky., r-p-ch-f-t-d	50,000
Tremonton, Box Elder Co., Utah, d-r-m	21,000
Trimble, Tenn., w-p-t-d	30,000
Tucumcari, N. M., w-p-d	35,800
Union City, Ind., w-p-t	44,000
Wagner, S. Dak., r-p-t (also sewer)	11,000
Wakeeney, Kan., w-d	23,500
Waldo, Ark., w-p-t-d	56,000
Ward, Colo., d-r	800*
Wasatch Co., Utah., d	35,000
Washington, Okla., w-p-t-d	14,000
Waterman, Ill., w-p	1,600
Watertown, Mass., d (also sewers)	50,000
Wells, Tex., w-p-r-t-d	20,000
West Seneca, N. Y., p-t-d	55,000
Whitesboro, Tex., w-p-s	4,500*
Wickenburg, Ariz., d-w-rh	19,000
Williams, Ariz., dm-r-s-d	120,000
Woodbury, N. J., w-p-q	50,000
Woodsboro, Tex., w-p-t-d	62,000
Worley, Idaho, w-d	10,000
Worthington, Ky., s-d	28,000
Yorktown, N. Y., d	16,000
Youngstown, N. Y., f	31,000

Sewers and Disposal Plants

Abingdon, Ill.	$47,000
Barton, Wisc.	21,000
Bessemer, Mich.	91,000
Bland, Mo.	25,500
Bolivar, Mo.	89,000
Bridger, Mont.	31,000
Canton, N. Y.	50,000
Canton, Tex.	18,000
Coalinga, Calif.	6,100*
Colton, Calif.	40,000
Danville, Ill., p	670,000
Decorah, Iowa	53,000
Dewey, Okla. p	24,000
Fayette Co., Ohio, p	150,000
Fennimore, Wisc.	103,000
Freeport, N. Y., p	185,000
Hamburg, N. Y.	57,000
Hartsville, S. C.	41,000
Hempstead, N. Y.	42,000
Hoboro, Ill.	84,000
Houston, Tex., p	403,000
Huntsville, Tex.	25,000
Joplin, Mo.	90,000
Kirbyville, Tex.	48,000
Lewisville, Tex.	31,000
Madison Co., Ill., p	139,000
Marion, Ind., p	384,000
Marshall, Mo.	38,000*
McHenry, Ill.	25,000
Milwaukee, Wisc.	22,000*
Norwich, Conn.	19,000*
Owosso, Mich.	131,000
Paris, Tex.	98,000
Petaluma, Calif.	325,000
Prescott, Ariz.	40,000
Ridgewood, N. J.	70,000
River Hills, Milwaukee Co., Wisc.	10,000*
Rochester, N. Y.	75,000
Russellville, Ky. (also water p-f-s-d)	96,000
Sacramento, Calif.	7,500*
San Mateo, Calif., p	141,000
Schenectady, N. Y.	187,000
Silver City, N. M.	19,000
Solvay, N. Y.	90,000
Stringtown, Okla.	15,000
Stuttgart, Ark.	20,000
Sycamore, Ill.	76,000
Terrell, Tex.	299,000
Tipton, Ind.	88,000
Tomah, Wisc., p	23,000
Verona, N. J.	191,000
Waldo, Ark.	37,000
Waukegan, Ill.	985,000
West Haverstraw, N. Y.	145,000
Woodridge, N. Y.	120,000

Sewers

Ardsley, N. Y. p	$223,000
Austin, Tex.	175,000
Boise City, Idaho	135,000
Brawley, Calif.	108,000
Brentwood, Mo. (also paving)	84,000
Cody, Wyo.	1,200*
Elgin, Ill.	17,000
Eureka, S. D.	18,000
Fanwood, Union Co., N. J.	65,00
Jackson, Ala	47,000
Kane Co., Ill.	38,000*
Montreal, Wisc.	6,000*
Nashville, Tenn.	450,000
New Orleans, La. (also water dist., cable, drainage)	2,570,000
Norfolk County, Mass.	125,000
Oskaloosa, Iowa	2,120*
Pleasantville, N. Y.	70,000
Port Chester, N. Y. p	30,000
Ridgewood, N. J.	38,000
Rutland, Vt.	15,000*
Rutland, Vt.	31,000*
St. Louis Co., Mo.	2,600*
Scarsdale, N. Y.	74,000
Sidney, Ohio	54,000
Solomon, Kans.	39,000
Sonoma, Calif	4,200*
Streator, Ill.	825,000
West Hartford Co., Conn.	42,000*
Wood River, Ill. p	110,800*

Storm Sewers

Buffalo, N. Y.	$582,000
Elmira, N. Y	313,000
Fresno, Calif.	15,300*
Houston, Tex.	236,000
Mobridge, S. D.	54,000
Sidney, Ohio	19,000
Somerville, Mass.	15,000*
Tonawanda, N. Y.	77,000

Incinerators

Lockport, N. Y.	$60,000

Street or Road Construction

Amesbury, Mass.	$3,300*
Amesbury, Mass.	6,000*
Arlington, Vt. (also bridge)	8,000*
Bee Co., Tex. (also bridges)	452,700
Bethel, Vt.	1,800*
Bozrah, Conn.	58,000
Brazoria Co., Tex.	60,700
Brazoria Co., Tex.	636,000
Brighton, Vt.	47,000
Bronxville, N. Y. (also sewers)	115,000
Caddo Parrish, La.	505,300
Caldwell Co., Tex.	47,000*
Chillicothe, Peoria Co., Ill.	7,000*
Cincinnati, Ohio	31,300*
Cliffton, Tex.	21,000
Colebrook, Conn. (also bridges)	116,700
Douglas, Mich.	5,600
Eagle Lake, Tex.	60,000
Eldorado, Ill.	12,500*
Elroy, Wisc.	20,900
Fairhope, Ala.	42,000
Fargo, N. D.	68,000
Goshen, Conn.	109,000
Granby, Conn (also bridges)	100,000
Grand Forks, N. D.	90,000
Gray Co., Tex.	120,000
Harwinton, Conn.	100,000
Hebron, Conn.	51,000
Hibbing, Minn.	5,500*
Holyoke, Mass.	53,300*
Iowa City, Iowa	30,000
Jamestown, N. Dak.	42,500
Kent, Conn.	140,000
Lake Placid, N. Y.	28,000
Lenoir, N. Car.	55,000
Little Falls, N. J.	33,000
Major Co., Okla.	195,500
Marion Co., Kans. (also bridges and culverts)	3,700*
Menard Co., Tex.	8,500
Merrill, Wisc. (also sewers)	39,800
Mobridge, S. D.	54,500
New Hartford, Conn. (also bridges)	131,000
New Haven Co., Conn.	118,000
New London, Conn.	21,000*
Ossining, N. Y.	99,000
Ottawa Co., Ohio	36,500*
Ozaukee Co., Wisc.	11,500*
Refugio, Tex.	60,400
Rouses Point, N. Y.	32,000
San Patricio, Tex.	78,832
Saugatuck, Mich.	6,000
Somerville, Mass.	66,200*
State of Calif., Sutter Co.	9,300*
Steuben Co., N. Y. (also bridges)	21,200*
Watertown, Mass.	40,000
Watertown, S. D.	73,600
Wethersfield, Conn.	66,000
White Plains, N. Y.	136,000
Whitmire, S. C.	9,000
Windham, Conn.	106,000
Winslow, Ill.	25,500

Bridges

Beacon Falls, New Haven Co., Conn.	$21,500*
Carpentersville, Ill.	24,250
Carthage, Jasper Co., Mo.	3,300*
Chicago, Ill.	484,500*
Cincinnati, Ohio	27,000*
Commonwealth of Mass.	100,500*
Hamden, Conn.	145,000
Hornell, N. Y.	40,000
Keith Co., Nebr.	28,600*
Killingworth, Conn.	17,000
Londonderry, Vt.	6,200*
Newfane, Vt.	2,000*
New Haven, Vt.	6,000*
Pawlet, Vt.	3,100*
Plymouth and Holderness, N. H.	33,000
Putney, Vt.	1,400*
Readsboro, Vt.	5,300*
River Hills, Wisc.	10,500*
Royalton, Vt.	9,000*
Rutland, Vt.	4,000*
Sacramento Co., Calif.	4,500*
Sacramento Co., Calif.	24,700*
Stamford, Vt.	3,500*
State of Conn. (also paving)	105,400*
Tolland, Conn.	100,000
Townshend, Vt.	2,400*
Wharton Co., Tex.	118,800
Whitingham, Vt.	4,700*
Worcester, Mass.	20,000*

Grade Crossing Elimination

State of N. J., So. Plainfield	$24,600*
Wheaton, Ill.	115,000

Power Plant & Equipment

Alleghany Co., N. Y.	85,000
Auburn, N. Y. (Diesel), enlargement existing waterworks power house.	319,000
Fort Morgan, Morgan Co., Colo. (steam)	23,500*
Hiram, Ohio (Diesel)	32,500
Iowa City, Iowa (steam, also distribution syst.)	917,000
Ludlow, Vt. (transformers)	1,300*
Marion Co., Ill. (steam)	477,000
Menominee, Mich. (Diesel)	803,000
Rockville Centre, N. Y. (Diesel)	260,000
St. Cloud, Minn. (steam, also distribution syst.)	1,229,000*
Seward, Alaska (steam and Diesel)	118,000
Stoughton, Wis. (Diesel)	39,000*

Schools

Alameda Co., Calif. (Valle Vista)	$4,300*
Alpine, Tex. (St. Teachers Coll.)	47,500
Arroyo Grande Gr. Sch. Dist., San Luis Obis Co., Calif.	53,500
Ashland, Ky.	146,000
Atoka Co., Okla.	2,250
Austin, Tex. (Univ. of Tex.)	198,000
Austin, Tex. (Univ. of Tex.)	210,000
Avinger, Tex. (Cass Co.)	3,300*
Baker Co., Ga.	26,000
Barre, Vt.	2,200*
Beeler, Ness Co., Kans.	7,000*
Belvidere, Warren Co., N. J.	98,500
Blessing Sch. Dist., Tex., Matagorda Co.	51,500
Bradford, Vt.	7,300*

(To be concluded)

Obituary

DANFORD W. DEAN, 81 years of age, widely known constructor of state buildings in New York, died at his home in Olean, N. Y., July 6.

KENNETH L. ANDERSON, assistant engineer in the Huntington, W Va., district office of the U. S. Engineer, died recently in New York. He had been a member of the engineering staff in the district for two years.

HAROLD H. SCOTT, formerly a member of the engineering staff of St. Louis and designer of the filtration plant at Chain of Rocks in that city, died in Fulton, Mo., July 10, at the age of 47. Until about four years ago Professor Scott was a member

of the faculty of Westminster College. He was forced to retire because of ill health.

ALFRED M. FELGATE, for many years bridge engineer for the county containing Cleveland, Ohio, died July 12 in North Ridgeville, Ohio, at the age of 70. He had retired from the county office in 1933. Prior to his service with the county he had been employed by the American Steel & Wire Co. and the King Bridge Co.

WILLIAM H. WALKER, research engineer and industrial chemist, well known in the field of corrosion study on iron and steel, died July 9 as the result of an automobile accident in New Hampshire. He was born in Pittsburg in 1869, and was the organizer and head of the department of chemical engineering at the Massachusetts Institute of Technology until 1921, when he retired to enter private practice. During the war he served as chief of the chemical division of the army.

HOWARD C. BLAKE, well known engineer of Detroit, Mich., was killed in an automobile accident near Somerset, Mich. He was 48 years old. He was a graduate of M.I.T. and served as an engineering officer in the A.E.F. in charge of construction, followed by 11 months of supervising restoration work in France. He came to Detroit in 1924 as architect's representative in the construction of several large buildings, subsequently becoming owner's representative in the erection of the Fisher Building.

KAY M. PRIEST, of the Bureau of Reclamation, formerly project manager of the Yuma project and for the past year in charge of the All-American canal project with headquarters in Yuma, Ariz., dropped dead in Phoenix, Ariz., July 6. He had been in the service of the Bureau of Reclamation continuously since 1903, and was 50 years old. Mr. Priest was born in Tombstone, Ariz., and attended the University of Arizona. In 1903 he began work with the topographic department of the U.S.G.S. and moved from this department of governmental service to the Reclamation Service. In 1909 he was superintendent of construction on the Yuma project and remained on that project in charge of construction, and later as superintendent, until 1933 when he was put in charge of the All-American Canal construction. Throughout most of his service in the Yuma district, Mr. Priest had the responsibility for the annual defense of the Yuma Valley levee against the floods of the Colorado river, an arduous duty requiring high skill and decision. Because of his intimate knowledge of the lower Colorado he was called upon a few years ago to make a joint report to the International Water Commission on the control of the lower river in collaboration with a representative of the Mexican Government.

CONSTRUCTION STATISTICS OF THE WEEK

THE award of Grand Coulee Dam combined with the third highest week of this year in private awards makes this week's engineering awards, at $56,276,000, top all records for the previous two years. Of this total $46,347,000 is for public and $9,929,000 for private work. Of the public work $34,330,000 is federal and $12,017,000 state and municipal and of the federal $29,339,000 is for Grand Coulee Dam.

The earthwork, irrigation, waterways classification this week totals $32,297,000, exceeding by a wide margin the year's average to date. Highway awards are at the low point for the year, $3,155,000. Industrial buildings, at $7,730,000 score the second highest week of the year. Sewerage awards are low and other classifications are close to last week's figures.

Large awards besides the Grand Coulee Dam in Washington include: a malt plant in Detroit, $500,000; Solvay Process Co. plant in Louisiana, $5,000,000; brewery in Kansas City, $500,000; distillery in New Jersey, $600,000; Timothy Dwight Unit at Yale University, $500,000; school, Jamestown, N. Y., $684,000; federal armory in Jersey City, $932,000; superstructure for Bettendorf-Moline bridge for Davenport Bridge Commission, Iowa, $687,000; gravel for Fort Peck Dam, $2,363,000; and signaling equipment for the Independent Subway, New York, N. Y., $2,827,000.

New capital for the week is low for non-federal projects both as to federal allotments and municipal bond sales. Allotments for federal work total $98,990,000 for the week.

CONTRACTS
(Thousands of Dollars)

	Weekly Average Week July 1933	Prev. 4 Weeks	July 19 1934
Federal Government	$632	$2,987	$34,330
State and municipal	5,704	13,844	12,017
Total public	$6,336	$16,821	$46,347
Total private	6,261	3,934	9,929
Week's total	$12,598	$20,755	$56,276
Cumulative to date:			
1933	$483,080	1934	$719,493

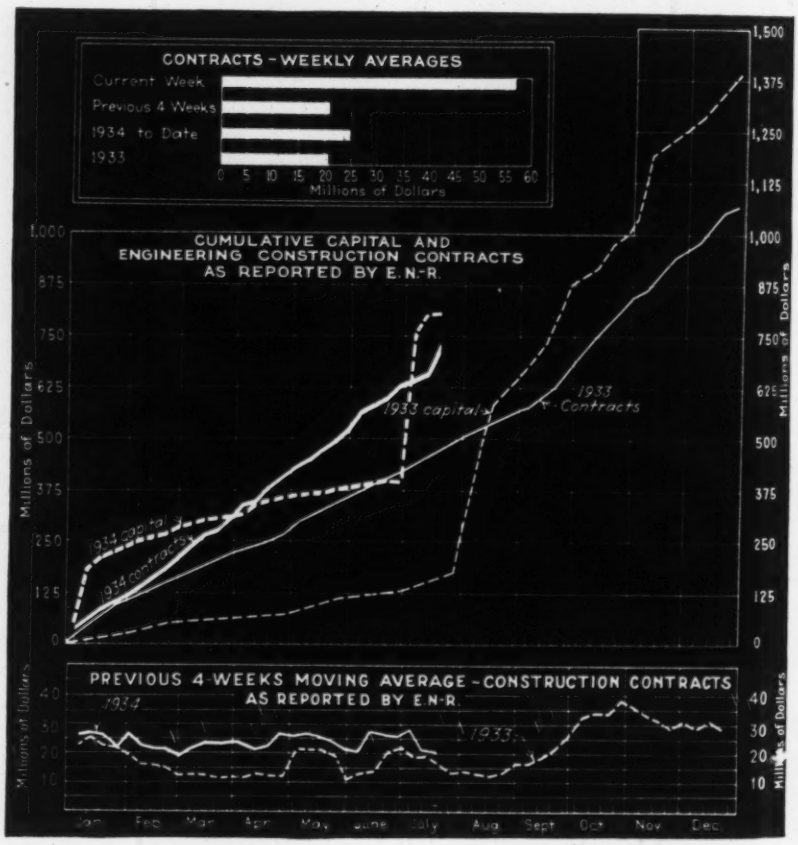
NEW PRODUCTIVE CAPITAL
(Thousands of Dollars)

1934	Week July 19	Cumulative
State and municipal	$855	$170,182
PWA allotments, S&M	255	549,003
RFC loans, S&M	.....	9,413
Corporate issues	.....	17,063
PWA allotments, private	350	55,787
Total, Non Federal	$950	$801,438
PWA allotments Federal Constr.	98,990	181,487
Total new capital	$99,940	$982,925
Cumulative to date:		
1933	$175,250	1934	$801,438

NOTE: These figures include private bonds, and stocks sold for productive purposes; state and municipal bonds for construction; PWA loans and grants to states and municipalities, including the special highway funds; PWA private loans, and allotments for Federal construction.

INDEX NUMBER

E.N.-R.-Cost	1913 = 100	1926 = 100	E.N.-R.-Volume	1913 = 100	1926 = 100
July, 1934	**199.65**	**95.97**	**June, 1934**	**119**	**50**
June, 1934	199.61	95.95	May, 1934	101	44
July, 1933	165.50	79.56	June, 1933	109	48
1933 (Av.)	170.18	81.80	1933 (Av.)	102	45
1932 (Av.)	156.97	75.45	1932 (Av.)	127	56
1931 (Av.)	181.35	87.17	1931 (Av.)	220	96.5


CONTRACTS - WEEKLY AVERAGES
Current Week
Previous 4 Weeks
1934 to Date
1933
0 5 10 15 20 25 30 35 40 45 50 55 60
Millions of Dollars
CUMULATIVE CAPITAL AND ENGINEERING CONSTRUCTION CONTRACTS AS REPORTED BY E.N.-R.
Millions of Dollars
1933 capital
1933 Contracts
1934 capital
1934 contracts
PREVIOUS 4 WEEKS MOVING AVERAGE - CONSTRUCTION CONTRACTS AS REPORTED BY E.N.-R.
1934
1933
Jan Feb Mar Apr May June July Aug Sept Oct Nov Dec

CONSTRUCTION REPORTS

WATERWORKS

PROPOSED WORK

Del., Rehoboth Beach—Village plans referendum election this month to vote on $160,000 bond issue for complete waterworks system throughout village. F. Ross, mayor. C. Buckley, c/o General Engineering Co., Wilmington, engr.

Ill., Benld—City soon takes bids waterworks and distribution system. $127,000 loan and grant allotted by P.W.A. Noted Sept. 21.

Ill., Charleston—City soon takes bids water filtration plant, wells, filter beds, filter equipment and settling basin, auxiliary piping. $100,000 grant and loan allotted by P.W.A. C. DeLeuw Co., 111 West Washington St., Chicago, engrs. Noted Dec. 21.

Ill., Collinsville—City soon takes bids waterworks, incl. deep well, pumping equipment, motors, pump house, 5,500 lin.ft. 12 in. c.i. main, 500,000 gal. reservoir. $168,000. P.W.A. allotted $100,000. Kinsey Eng. Co., Pekin, engrs. Noted Dec. 14.

Ill., Des Plaines—Village preliminary plans completed and takes bids in about 60 days, ground level rein.-con. 1 m.g. capacity water reservoir, and water softening plant, pumping equipment and watermains. $300,000. P.W.A. loan granted. W. H. Allen, 1484 Miner St., engr. J. A. M. Robinson, 228 North La Salle St., Chicago, consult. engr.

Ill., Elmhurst—Bd. Local Imprvts., preparing working drawings 1 m.g. concrete reservoir, pumping equipment, booster pumps, 2 iron pipe lines, $66,000. Gordon & Bulot, 53 West Jackson Blvd., Chicago, engrs. Noted Mar. 16.

Ill., Fairbury—City soon takes bids improving and extending waterworks. $55,000 grant and loan allotted by P.W.A.

Ill., Greenfield—City soon takes bids waterworks and distribution system. $66,000 grant and loan allotted by P.W.A.

Ill., McLeansboro—City soon takes bids improving waterworks. $74,000 grant and loan allotted by P.W.A.

Ill., Midlothian—City soon takes bids waterworks and distribution system. $40,000 grant and loan allotted by P.W.A.

Ill., Mount Prospect—City, N. F. Meyer, clk., preliminary plans completed and takes bids in 30 to 60 days 1 story, pump house, 250,000 gal. capacity, $18,000. P.W.A. funds granted. Townsend, Consoer, Older & Quinlan, 205 West Wacker Dr., Chicago, engrs.

Ind., Union City—Bd. Trustees waterworks, S. J. Fisher, pres., soon takes bids 2 wells, elevated steel tank, pumping equipment and motors for enlarging water supply. $45,000. P.W.A. project. Noted June 22, 1933.

Ia., Storm Lake—City Council soon takes bids packed gravel well, pump, watermains extensions. $20,000. Water Revenue bonds will finance. Noted July 5.

Kan., Bazine—City plans waterworks, complete new plant. Hefling & Hughes Eng. Co., Hutchinson, engrs. P.W.A. approved loan and grant.

Kan., Fort Scott—City plans filter plant, four 1 m.g. units, $135,000. Black & Veatch, 700 Mutual Bldg., Kansas City, Mo., engrs. P.W.A. approved loan and grant. Noted Mar. 8.

Kan., Independence—City plans waterworks improvements, incl. oil engines, generators, centrifugal pump. $60,000. G. Hackmaster, Independence, city engr. P.W.A. approved loan and grant. Noted Apr. 26.

Kan., Osawatomie—City plans water and electric light plant. Burns & McDonnell Eng. Co., 107 West Linwood Blvd., Kansas City, Mo., engrs. P.W.A. approved loan and grant. Noted Mar. 8.

Ky., Morganfield—City, waterworks additions, $23,135. P.W.A. rescinded loan. Project may be dropped. Black & Veatch, 405 East 13th St., Kansas City, Mo., engrs. Noted July 19.

Ky., Tompkinsville—City plans waterworks system, $50,000. P.W.A. project. J. S. Watkins, 714 Citizens Bank Bldg., Lexington, engr.

Ky., Morganfield—City soon takes bids reservoir improvement, new cover and general repairs. Black & Veatch, 405 East 13th St., Kansas City, Mo., engrs. Noted Mar. 22.

Mass., Swampscott—Town, Water & Sewer Bd., Town Hall, plans constructing watermains in Highlands Section. Special town meeting will be held latter part of July. W. W. Pratt, town engr.

Minn., St. Paul—City plans reconstructing waterworks, incl. 1,500 kw. turbo-generator and pumping unit in McCarron Pumping Station and c.i. pipe line to Mississippi River. $134,000 loan and grant allotted by P.W.A. constructing 2,600 lin.ft. rein.-con. conduit, 600 ft. steel intake and 900 ft. canal between lakes. $85,000 P.W.A. loan and grant; 500,000 gal. elevated water storage tank in West Side Service Dist., $31,000 loan and grant; elevated water storage tank in St. Anthony Park, $15,000 loan and grant. G. M. Shepard, city engr.

Miss., Laurel—City plans waterworks, incl. 1½ m.g. elevated storage tank, installing connecting mains and other improvements. $129,000 P.W.A. loan granted. H. A. Mentz, Hammond, engr.

Miss., Ripley—City, granted $65,000 loan and grant by P.W.A. to purchase privately-owned waterworks and construct new well, pump house, concrete reservoir, elevated storage tank and extensions of distribution system. Beard Eng. Co., Clayton, Mo., engrs.

Mo., Hayti—City soon takes bids waterworks improvements and extensions. $22,800 allotted by P.W.A. W. A. Fuller, 2916 Shenandoah Ave., St. Louis, engr. Noted May 24.

Mo., Miller—City plans waterworks. $35,000 P.W.A. approved loan and grant. Ozark Eng. Co., Court House, Springfield, engrs. Noted

Mo., Monett—City soon takes bids waterworks improvements and extension. $32,000 loan and grant allotted by P.W.A. L. W. Adams, Monett, engr. Burns & McDonnell Eng. Co., 107 West Linwood Ave., Kansas City, engrs. Noted Apr. 26.

Mo., Perry—City plans waterworks system. $50,000 loan and grant approved by P.W.A. W. B. Rollins & Co., 339 Railway Exch. Bldg., Kansas City, engrs. Noted Dec. 21.

Mo., St. Charles—City soon takes bids 2 story, 70 x 80 ft., rein.-con., brick filtration plant, filter equipment, $65,000 grant and loan allotted by P.W.A. Russell & Axon, 4903 Delmar Blvd., St. Louis, engrs. Noted Dec. 7, 1933.

N. J., Chester—Bd. Boro Council, J. C. Hoffman, clk., plans waterworks. $50,000 P.W.A. allotted funds. G. W. Knight, 38 East Park St., Newark, engr. Noted Nov. 9.

N. Y., Batavia—Election July 24, $100,000 for constructing 1½ m.g. water storage tank. C. Hartley, mayor. Noted July 21.

N. Y., Medina—Village Bd. election soon to vote on accepted plan for new waterworks system. $80,000-$400,000. Noted Feb. 18.

N. C., Burgaw—Town plans waterworks. $48,000 P.W.A. loan approved. J. B. McCrary Co., Marietta St., Atlanta, Ga., engrs. Noted Mar. 15.

N. C., Faison—Town plans waterworks. $47,000 P.W.A. loan approved. W. F. Freeman, High Point, engr.

N. C., Hemp—Hemp Sanitary Dist. (Moore Co.) plans waterworks system for sanitary district in Moore Co. $80,000 P.W.A. loan approved. Edwards & Van Camp, Southern Pines, engrs.

N. C., Hickory—Town plans waterworks improvements. $31,000 P.W.A. approved loan. W. C. Olsen, 5 Exchange Pl., Raleigh, engr. Noted Mar. 22.

N. C., Lenoir—Town plans waterworks extensions. $60,000. P.W.A. loan approved. M. M. Williams, Lenoir, engr. Noted Mar. 22.

N. C., Murfreesboro—Town plans waterworks. $57,700. P.W.A. loan approved. Spoon & Lewis, Greensboro, engrs. Noted Mar. 15.

N. C., Richlands—Town plans waterworks. $31,185. P.W.A. approved loan. W. F. Freeman, High Point, engr. Noted Mar. 22.

N. C., Spruce Pine—Town plans waterworks. $16,000. P.W.A. project. M. Sheppard, Spruce Pine, engr. Noted Dec. 21.

N. C., Yadkinville—Town plans waterworks. $44,000. P.W.A. approved loan. W. F. Freeman, High Point, engr. Noted Mar. 15.

O., Logan—City withdrew application for $95,000 loan and grant to finance waterworks improvements, due to the fact that sale of water from city's water plant, has been decreasing steadily. K. R. Fitzgerald, mayor.

Pa., Smithton—Borough plans municipal water supply system, incl. new pumping station on Youghiogheny River, filtation plant and connections to distributing system. $13,000 P.W.A. loan and grant approved.

Tex., Pasadena—City, c/o W. C. McMasters, mayor, voted $38,000 for water and sewer extensions. P.W.A. approved $38,000 loan and grant. Culpepper & Flatt, Rusk Bldg., Houston, engrs. Noted June 21.

Tex., Richland Springs — City, c/o J. B. Coffey, mayor, soon takes bids waterworks, incl. 5 new deep wells, electric or gas engine pumping equipment, 10,000 lin. ft. supply mains, 12 in. c.i. pipe distributing lines, vitr. clay or concrete pipe. $30,000. P.W.A. project. J. S. Bross, San Saba, resident engr. Noted Jan. 25.

Utah, Coalville—City making plans 250,000 gal rein.-con. reservoir. M. Dorland, 55 South 21st East St., Salt Lake City, engrs.

Utah, Panquitch—City plans modernizing and extending present water system. $42,000. P.W.A. loan allotted. Noted Oct. 26.

Utah, Parowan—City plans municipal water and light plant extensions and improvements. Bond election soon to secure P.W.A. loan. $74,000. P.W.A. funds granted. A. Fife, Cedar City, engr.

Utah, Spanish Fork—City election Aug. 7, $88,000 bonds to secure similar P.W.A. loan for waterworks improvements, incl. replacing wood pipe with c.i. pipe. Caldwell & Richards, Templeton Bldg., Salt Lake City, engrs. Noted July 27, 1933.

Utah, Spring City—City plans constructing concrete reservoir and enlarging distribution system. $63,000. P.W.A. loan granted. Noted Feb. 23.

Wis., Durand—City, A. C. Smith, clk., making plans water system addition, incl. pumping equipment and mains. O. G. Holway, Durand, engr.

Wis., Fond du Lac—City, W. Coffman, clk., plans installing water softener for city water supply. G. H. Stanchfield, engr.

Wis., Frederic—City, M. Peake, clk., making plans improving waterworks incl. mains, pumping equipment, etc. $17,000. A. Westenberg, Frederic, engr.

Ont., Burlington—City by law, voted $120,100, addition to waterworks. Noted July 5.

Ont., Fergus—Town, H. Gibson, clk., making plans new waterworks pumping system, possibly involving new 250 ft. well, 12 in. base, and new or additional pumping equipment.

Que., Longueuil—City voted $106,000 for addition to waterworks. M. J. Rutledge, engr. Noted June 7.

BIDS ASKED

Ind., Crown Point—Aug. 4, by City, constructing water purification plant and water softening plant, deep wells and pumps, 300,000 gal. elevated tank, watermains and meters. $98,000. P.W.A. project. C. Brossman, Chamber of Commerce Bldg., Indianapolis, engr. Noted Apr. 26.

Ia., Guthrie Center — Aug. 7, by Town Council, extending present system watermains, 18 fire hydrants, elevated steel tank, iron removal plant, filter equipment, chemical feeder, mixing chambers. Buell & Winter Eng. Co., Insurance Exch. Bldg., Sioux City, engrs. Noted Oct. 26.

Mass., Georgetown—July 25, by Town, Bd. Water Comrs., Town Hall, installing 8 mi. 6- to 10-in. c.i. waterpipes and fittings, gate valves,

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Federal Government projects are classified under heading denoting type of work and designated by symbol of †

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†*Federal Government.*

For official proposal advertising see Searchlight Section

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Waterworks (Continued)

hydrants, service connections, elevated steel tank and appurtenances. Fay, Spofford & Thorndike, 44 School St., Boston, engrs.

Mass., Paxton—July 26, at office X. Henry Goodnough, Inc., engrs., 14 Beacon St., Boston, furnishing, erecting 25 ft. diam. 100 ft. high standpipe on concrete found. furnished by Town. P.W.A. Docket 1164 adv. E.N.-R. July 19.

N. C., Tarboro—July 26, by City, water filter improvements, water extensions, $200,000. J. C. Martin, city mgr. W. C. Olsen, 5 Exchange Pl., Raleigh, engr.

N. Y., East Rochester—July 23, by Village, drilling 2 wells, in George Harris Property, Garfield St. Noted July 5.

Okla., Cleveland—July 31, by City, water supply, incl. 500,000 gal. concrete reservoir, 1 m.g. filtration plant, dam, 32,000 ft. 10 in. pipeline, pumping plant, $164,000. P.W.A. loan and grant. O. F. Sewell, Pawnee, engr. W. R. Holway, 302 East 18th St., Tulsa, consult. engr. Noted Feb. 22.

S. C., Lynchburg—July 25, by City Council, J. D. Dougherty, mayor, installing complete waterworks system, incl. **(a)** distribution system, pipe lines, valves, meters, and tank foundation **(b)** 2 deep wells and 2 buildings **(c)** 75,000 gal. elevated steel tank on 100 ft. tower, $31,500. Ryan Eng. Co., Arcade Bldg., Columbia, engrs.

S. C., Society Hill—July 24, by City Council, E. D. Field, Jr., mayor, complete waterworks system **(a)** water distribution system, incl. pipe lines, valves, meters and tank foundation **(b)** 1 deep well and 1 deep well pump and building **(c)** 50,000 gal. elevated tank on 60 ft. tower, $24,000. Ryan Eng. Co., Arcade Bldg., Columbia, engrs. Noted Feb. 22.

CONTRACTS AWARDED

†**Calif., Los Angeles**—Vet. Bu., Arlington Bldg., Wash., D. C., cemetery lawn sprinkling system at Veterans Administration Hospital, to Peterson Bros., 239 West Olive St., Inglewood, approximately $20,000. Awarded July 2.

Calif., Salinas—M. Martin, clk. Salinas Union High School Dist., equipment for installing electric pumping plant and pressure tank, to Byron-Jackson Co., 4th and Carleton Sts., Berkeley., $2,245; pipe valves and fittings, to Anderson-Dougherty-Harris Co., 225 Main St., $3,573. Bids June 28, awarded July 2.

Ill., Maywood—City, 3 m.g. underground rein.-con. reservoir, with tennis courts on roof, to R. C. Wieboldt Co., 1412 Washington Blvd., Chicago, $68,595. **P.W.A.** Bids June 21. Noted Apr. 12.

Ind., Anderson—City, improving waterworks, incl. 60x120 ft. building, 90x155 ft. reservoir on Wheeler Ave., to T. P. Kelley & Son, 6th and Brown Sts., $199,777. Est. $209,000. **P.W.A.** Noted May 24.

Ind., Hope—Town, 2 pump houses, distribution system, elevated tanks and pumps, to Ostrom Realty & Constr. Co., 625 Peoples Bank Bldg., Indianapolis. Est. $56,000. **P.W.A.** J. W. Moore, 835 Knights of Pythian Bldg., Indianapolis, engr.

Ind., Hope—Town, S. Lambert, clk., waterworks equipment, tank and tower, to W. E. Caldwell, 200 East Brandeis St., Louisville, Ky., $6,602. **P.W.A.** Noted May 3.

Kan., Coffeyville—City, water softening plant, to Universal Constr. Co., Coffeyville. **P.W.A.** Chas. A. Haskins & Co., 517 Finance Bldg., Kansas City, Mo., engrs.

Ky., Burkesville—City, waterworks and distribution system, to T. C. Brooks & Co., Detroit, Mich., $47,094. Bids June 4. **P.W.A.** Noted May 31.

Ky., Guthrie—City at office of J. A. Webb, mayor, waterworks, involving 35,100 ft. 2-to-8-in. c.i. pipe, 39 fire hydrants, 150,000 gal. elevated tank, small pump house, valves, pump, etc., to Pittsburgh-Des Moines Steel Co., 1015 Tuttle St., Des Moines, Ia., $65,000; 2 deep wells, to Morris Forge & Drilling Co., 972 Cooper St., Knoxville, Tenn. $9,800. Est. $68,000. Bids July 10.

Ky., Irvington—City Council, at office Town Clerk, constructing waterworks system, incl. wells, pumps, filter plant, piping and meters, to W. L. Hailey & Co., Cotton States Bldg., Nashville, Tenn., $34,186; tank on tower, to W. E. Caldwell Co., 200 East Brandeis St., Louisville, $6,300. **P.W.A.** Bids June 25, awarded June 28.

Minn., Minneapolis—City, structural steel for Water Dpt., to Crown Iron Wks. Co., 1229 Northeast Tyler St., $1,240. Bids June 29.

Minn., Virginia—City, water tank and tower, to Pittsburgh Des Moines Steel Co., 1015 Tuttle St., Des Moines, Ia., $8,200. Bids June 18. Noted June 21.

Nev., Carlin—City, drilling and testing 2 deep wells, to Judd Underwood, Reno, $6,230••• c.i. pipe and fittings, to Pacific States Cast Iron Pipe Co., Provo, Utah, $18,555•••steel pipe and fittings, to California Corrugated Culvert Co., West Berkeley, Calif., $4,752•••sewer pipe and accessories, to Utah Fire Clay Co., Hanauer Ave. and 1st St., West Salt Lake City, Utah, $5,852•••fire hydrants and auxiliary gates, to Rensselaer Valve Co., 55 New Montgomery St., San Francisco, Calif., $2,713•••valves, valve boxes, manhole frames, to Waterworks Equipment Co., 242 West 2nd St. S., Salt Lake City, Utah, $1,726•••general contract installing waterworks improvements, to Mullins & Wheeler, 2203 South Highland Dr., Salt Lake City, Utah, $35,000. **P.W.A.** Grand total $75,328. Est. $77,000. Noted June 28.

N. Y., Niagara Falls—City, constructing filtration plant, to Wright & Kremers, Inc., Pine Ave. and Main St., $143,900. Total est. $300,000. **P.W.A.** Bids June 26, awarded July 6. Noted June 14.

O., Belpre—City, constructing waterworks system, elevated storage tank, distribution lines, to Getz Bros., Baltic, $50,552. **P.W.A.** Noted Mar. 8.

Pa., Lansford—Panther Valley Water Company, subsidiary Lehigh Coal & Navigation Co., engineering and construction contract for completion of Still Creek Dam, involving extending 10,000 ft. 30 in. pipe line, from Coaldale to Lansford, Carbon Co., 155,000 cu.yd. embankment, to raise existing dam from 60 to 90 ft. high, to Gannett, Eastman & Fleming, Inc., 600 North 2nd St., Harrisburg. Est. about $300,000.

Tenn., Parsons—U. G. Chumney, mayor, waterworks and sewerage systems, to Volz Constr. Co., Baltimore Bldg., Memphis, $71,150; tank, to Chicago, Bridge & Iron Co., 37 West Van Buren St., Chicago, Ill., $8,450. Bids July 5. Noted Nov. 30.

Tex., Taylor—City, c/o O. W. Davis, mgr., drilling, casing and developing 1 Trinity sand water well, 12- to 6-in. complete, to L. Coffield, Rockdale, $20,000. **P.W.A.** Bids July 5.

Vt., St. Johnsbury—Village Trustees, waterworks improvements, concrete and rock founds. for two 500,000 gal. steel storage tanks, to E. L. Knight, South Royalton, $5,882; erection of tanks, to Chicago Bridge & Iron Wks., 165 Bway., New York. **P.W.A.** Bids July 3, awarded July 10. Noted May 31.

Wash., Tonasket—City Council, 8,675 ft. 6 and 8 in. iron pipe, valves and fittings, to Palmer Supply Co., Westlake Ave., Seattle, $10,615. Bids July 10.

Ont., Port Hope—City, 250,000 Imperial gal., rein.-con. filter and reservoir, to T. A. Brown Co., Box 1030, Peterboro, $9,661. Noted Nov. 2.

SEWERAGE AND WASTE DISPOSAL

PROPOSED WORK

Ark., Harrison—City, R. Worthington, mayor, plans sewerage system, $125,000. P.W.A. project. F. A. Pritchett, Markham and Main Sts., Little Rock, engrs. Noted Sept. 14.

Ark., Waldo—City, H. M. Black, mayor, making plans sewerage system, $37,000. P.W.A. project. R. E. Williams, 2427 Broadway, Little Rock, engrs.

Calif., Burlingame—City plans constructing main sewer connecting 6 existing outfalls and sewage disposal plant. P.W.A. allotted $147,000 loan and grant to finance same. C. M. Thomas, city engr. Noted July 20, 1933.

Ill., Abington—City plans sewage disposal plant, trickling filter type. P.W.A. granted $47,000. Wells Eng. Co., Geneva, engrs.

Ill., Dixon—City awaits passage of enabling ordinance for constructing sewerage system in various streets. $285,000 allotted by P.W.A. C. DeLeuw & Co., 20 North Wacker Dr., Chicago, Ill., engrs.

Ill., Edwardsville—City bids late in July or early in August, sewage disposal plant, auxiliary piping, sewer connections. $199,000 loan and grant allotted by P.W.A. W. H. Morgan, city engr. Noted June 21.

Ind., Elkhart—Elkhart Packing Co., making plans sewage disposal plant to eliminate pollution for Yellow River. O. Leonard, Frankfort, engr.

Ill., Monmouth—City plans sewage treatment plant and connecting sewers. $157,000. $142,000 allotted by P.W.A. Kinsey Eng. Co., Pekin, engrs. Noted Dec. 21.

Ind., Marion—City, preliminary plan completed and takes bids in 30 to 60 days sewage disposal plant and intercepting sewers. $384,000. P.W.A. funds allotted. Townsend, Consoer, Older & Quinlan, 205 West Wacker Dr., Chicago, Ill., engrs. J. W. Moore & Son, 835 Knights of Pythias Bldg., Indianapolis, assoc. engrs. Noted Jan. 25.

Kan., Holton—City plans sewage disposal plant improvements. $25,000. P.W.A. approved loan and grant. Wilson Eng. Co., Salina, engrs.

Kan., Manhattan—City plans storm sewer, $50,000. P.W.A. approved grant. Wilson Eng. Co., Salina, engrs.

Kan., Mound Ridge—City plans sewers and sewage disposal plant. $50,000. P.W.A. approved loan and grant. F. E. Devlin, W. H. Bldg., Wichita, engr.

Kan., Solomon—City plans 10 and 12 in. sewers. $40,000. Wilson Eng. Co., Salina, engrs. P.W.A. approved loan and grant. Noted Jan. 11.

Md., Chestertown—City plans application to P.W.A. for funds to finance construction disposal plant and various sewers. $45,000. Preliminary plans completed. **Maturity** this **fall.** Whitman, Requardt & Smith, Charles and Biddle Sts., Baltimore, engrs. Noted Feb. 15.

Mo., Bolivar—City soon takes bids for sewage disposal plant, auxiliary piping sewerage system in various streets. $89,000 grant and loan allotted by P.W.A. E. T. Archer & Co., 606 New England Bldg., Kansas City, engrs. Noted Mar. 15.

Mo., Marshall—City soon takes bids for sewage disposal plant, auxiliary piping. $135,000. $38,000 grant allotted by P.W.A. J. W. Shikles & Co., 708 New York Life Bldg., Kansas City, engr. Noted Jan. 11.

Mo., Thayer—City soon takes bids complete sanitary sewerage system, $42,000 loan and grant allotted by P.W.A. W. A. Fuller & Co., 2916 Shenandoah Ave., St. Louis, engrs. Noted May 17.

N. C., Spindale—Town plans sewage treatment plant. $61,529. P.W.A. loan approved. H. Beebe, Spartanburg, engr.

Tex., Dallas—City soon takes bids hydraulic fill, sewers, pumps and motors, sanitary sewer, pump plant addition. $50,000. P.W.A. allotment approved. City Engineer, engr.

Tex., Dallas—City, c/o J. N. Edy, mgr., plans sewer mains and pumping plant addition, $69,849 P.W.A. allotment approved. O. H. Koch, dir. P. Wks.

Tex., Houston—City, c/o O. F. Holcombe, mayor, plans sewer improvements, incl. additional trunk lines, pumping equipment and additions to sanitary sewers, $403,000. P.W.A. allotment approved; constructing lateral sewer mains, $143,000. P.W.A. grant approved by C.W.A. J. M. Nagle, city engr. Noted July 12.

Tex., Huntsville—City, c/o A. T. McKinney, mayor, plans sanitary sewer improvements, $25,000 P.W.A. allotment approved. J. C. McVea, 1318 Kipling St., Houston, engr. Noted Jan. 11.

Tex., Lewisville—City, c/o mayor, plans sewerage system distribution plant. $31,000 P.W.A. allotment approved. F. J. Von Zube, Fair Bldg., Fort Worth, engr.

Tex., Pasadena—See "Waterworks."

Tex., Port Lavaca—City, c/o F. M. Dudgeon, mayor, plans complete sewerage system, incl. treatment plant. $52,700 P.W.A. allotment approved. J. C. McVea, 1318 Kipling St., Houston, engr.

Tex., Stanton—City, c/o S. C. Houston, mayor, plans sanitary sewerage system, $33,744 P.W.A. allotment approved. Montgomery & Ward, Harvey-Snider Bldg., Wichita Falls, engrs. Noted Nov. 30.

Wis., Barton—City, J. Willkoni, clk., plans sewage disposal plant and equipment. $25,000. Engineer not appointed.

Wis., South Milwaukee—City making plans and takes bids in about 60 days sewage disposal plant, intercepting sewer, primary treatment plant, clarifier, sludge, digestion and grit chamber. $90,000. Townsend, Consoer, Older & Quinlan, 205 West Wacker Dr., Chicago, Ill., engrs. Noted Oct. 19.

Wis., Sun Prairie—City, H. R. Twiton, clk., making plans sewage treatment plant, incl. equipment. W. G. Kirchoffer, 22 North Carroll St., Madison, engr.

Wis., Tomah—City, E. Sowle, clk., making plans sewage disposal plant addition. $25,000. H. V. Tenant, Portage, engr.

Sask., Regina—City Engineer, bids in July modern primary settling tank and 2 sludge digestion tanks for sewerage disposal plant, $101,000, of which tanks are estimated $54,000 and labor $47,000.

BIDS ASKED

Ill., Chicago—July 26, by J. J. Sullivan, clk. Sanitary Sewer Dist., 910 South Michigan Ave., constructing West Side Intercepting Sewer. Contr. 10. Noted May 31.

La., Shreveport—July 25, by Common Council, constructing new incinerator. $180,000. P.W.A. project. Jones, Roessle, Olschmer & Wiener, Shreveport, engrs. Noted Apr. 26.

Mass., North Adams—Aug. 2, by City, Commissioner P. Wks., City Hall, constructing sewage treatment plant. P.W.A. project. Metcalf & Eddy, 1300 Statler Bldg., Boston, engrs. Noted Feb. 8.

†*Federal Government.*

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S. werage, etc. (Continued)

Mass., Waverly—July 24, by Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, constructing concrete trunk sewer. P.W.A. Project M52. Docket 3380. $42,000 loan and grant. J. J. Van Valkenburgh, Irving Sq., Framingham, engrs.

Minn., St. Paul—Aug. 6, by Minneapolis-St. Paul Sanitary Dist., A. G. Bastis, chn., 1623 University Ave., St. Paul, constructing Contr. 404, Div. E, Job 500, incl. 5,000 ft. tunnel, 11 ft. 9 in. inside diam. double elliptical section or 11 ft. 9½ in. circular section or 12½ ft. modified semi-elliptical section from Griggs St. and St. Antony Ave. to Pierce St. and Roblyn Ave. $420,000 (not official). C. C. Wilber, ch. engr. constr.

N. H., Keene—July 26, by City, P. F. Babbidge, supt. Water Dpt., City Hall, Contr. 1, constructing intercepting sewer, connecting sewers, force main and effluent main; Contr. 2, pumping station, Imhoff tanks and sludge beds; Contr. 3, pumping equipment. $170,000. P.W.A. project. Weston & Sampson, 14 Beacon St., Boston, Mass., engrs.

N. Y., Brooklyn—July 25, by R. V. I. Ingersoll, pres. Brooklyn Boro. Boro Hall, storm and sanitary sewers in Bedford Ave., East 52nd St., Terrace Pl. and Quentin Rd.

N. Y., New York—July 24, by S. Levy, pres. Manhattan Boro, Municipal Bldg., altering and improving sewer on west side Central Park West from West 89th to West 90th Sts.

CONTRACTS AWARDED

Conn., Bridgeport—City Clerk, City Hall, sanitary sewer main in Park Ave., to Leverty & Hurley, 500 Waterview Ave., Bridgeport. Est. $25,000. Bids May 11.

Conn., Hartford—Metropolitan Dist. Comn., Contr. 4, grit collecting mechanisms and Contr. 6, racks for sewerage plant, to Chain Belt Link Co., 1600 West Bruce St., Milwaukee, Wis., $26,848 and $6,800 respectively***Contr. 5, sluice gates, to Chapman Valve Co., Indian Orchard, Mass., $10,850. Grand total $44,498. Bids June 27. Noted June 21.

Ill., Bloomington—Bloomington-Normal Sanitary Dist., constructing Valley Relief Sewer, 1,600 ft. open cut and 3,225 ft. sewer in tunnel 66 or 72 in. concrete segment blocks or monolithic concrete, to J. L. Simmons Co., Inc., Bloomington, $110,000. P.W.A. allotted $133,000 for project. **P.W.A. (Correction)**—Location of project and name of owner. Noted July 5.

Ill., Chicago—Sanitary Dist. of Chicago, transferred contract for constructing West Side Intercepting Sewer, Contr. 4, to Ready Coal & Constr. Co., 205 West Wacker Dr., $1,620,510. Reawarded July 12. Project formerly awarded to Newman Constr. Co., 21 North Curtis St., but work never started. **P.W.A.** Bids Sept. 10, 1931. Noted Oct. 29, 1931, under "Contracts Awarded."

Kan., Sabetha—City Clerk, sewage disposal plant to G. F. Roberts, Sabetha. Est. $34,000. **P.W.A.** Bids May 23. Noted Apr. 5.

Md., Williamsport—City, 23,000 lin. ft. 8 in. sewers and 3 treatment plants, to N. Martell, 4400 Vesta Ave., Baltimore. Est. $88,000. **P.W.A.** Bids June 19. Noted June 14.

Mass., Newton—City, P. Buildings Comn., City Hall, Part 1, constructing incinerator building, incl. plumbing and electrical work, to Turner Constr. Co., 137 Newbury St., Boston, $72,747; Part 2, furnishing, installing furnaces and appurtenances and building radial brick chimney in Pipe Enz. Co., 122 Livingston St., Brooklyn, N. Y., $80,057. **P.W.A.** Bids June 29, awarded July 9. Noted June 14.

Mass., North Adams—City, J. P. Miller, comr. P. Wks., City Hall, constructing intercepting sewer, Contr. 4, P.W.A. Docket 1273, to Middlesex Constr. Co., Victory Bldg., Framingham, $31,715. **P.W.A.** Bids June 25, awarded July 6. Noted June 21.

Mo., Brookfield—City, constructing sewage treatment plant, incl. primary clarifier, secondary clarifier, excavation, concrete work, tile pipe, c.i. pipe, pumps, to Municipal Service Co., Dwight Bldg., Kansas City, $48,037. **P.W.A.**

Mo., St. Louis—City, constructing 1,200 ft. 36 in. sewer in brick masonry or rein.-con. tunnel, Sect. C-3, Downtown Relief Sewerage System, to Martin & Reilly, 7227 Lindell Blvd., $32,706. Est. $35,000. **P.W.A.** Bids July 10. Noted June 21.

O., Columbus—W. J. Lucks, dir. Service, constructing Relief Sanitary Sewer, Contr. 10, Sect. 1 in Woodland Ave., involving 8,270 ft. 30- to 42 in. rein.-con. pipe, 21,000 cu.yd. excavating, 121,000 lb. billet steel, 8,250 ft. 6- to 10-in. vitr. clay subdrain, to Canani & Rossi, 297 South High St., $79,342. **P.W.A.** Bids June 26.

†*Federal Government.*

Tenn., Parsons—See "Waterworks."

BRIDGES AND GRADE CROSSINGS

PROPOSED WORK

Calif., San Francisco—City and San Francisco Co., plan trestle in connection with Pipe Line No. 2, Hetch Hetchy Municipal Water Project, $200,000 or more. Will be partly financed with P.W.A. funds. N. A. Eckhart, 425 Mason St., ch. engr. and genl. mgr. San Francisco Water Dpt. Plans have yet to receive approval of P. Utilities Comn.

Ind., Greenfield — Pennsylvania R.R. Co., T. J. Skillman, ch. engr., Broad Street Sta., Phila., Pa., plans new bridge at Six Mile Creek, west of here. Hancock Co.

Miss., Lucedale—Bd. Supervs., George Co. plans election $37,000 bonds to finance construction new bridge over Pascagoula River on Lucedale-Wiggins Rd. $37,000.

Mo., Camden—Camden Co., J. M. Bunch, presiding judge, rein.-con., steel highway bridge over Lake of Ozarks. $666,280. $660,000 allotted by P.W.A. Sverdrup & Parcel, 2035 Railway Exch. Bldg., St. Louis, engrs.

Mo., St. Louis—City plans constructing rein.-con. viaduct to carry Hampton Ave. across tracks Missouri Pacific and St. Louis-San Francisco Railroad, River Des Peres and Manchester Ave., $363,500. P.W.A. allotted $165,000, eliminating grade crossings on Wabash Ry. between Union and Delmar Blvds., $616,400. P.W.A. allotted $134,000; underpass under Missouri Pacific tracks at Kingshighway Blvd., $556,300. P.W.A. allotted $155,000; eliminating grade crossings at Gravois Ave., Missouri Pacific tracks, Bircher St. and Terminal R.R. belt line, Sarah St. and Wabash tracks, Flyer Ave. and St. Louis-San Francisco R.R., $1,570,000. P.W.A. allotted $332,330. Noted Mar. 16, 1933.

N. Y., East Aurora—Pennsylvania R.R. Co., T. J. Skillman, ch. engr., Broad St. Sta., Phila., Pa., plans eliminating various grade crossings. Pub. Serv. Comn. directed railroad to do certain work by day labor not to exceed $176,000.

BIDS ASKED

Calif., San Francisco—Public Utilities Comn., City Hall, taking bids constructing timber trestle to support sections of Bay Crossing Pipe Line 2 over marsh lands at Dumbarton Strait, 19,300 ft. long, divided into 3 sections, 9,000 ft. 7,600 ft. and 2,700 ft. involving 115,000 ft. untreated pilinz, 47,000 ft. creosoted piling, 690,000 ft. redwood lumber, 60,000 ft. pine lumber, 65,000 lb. bolts, nuts and drift bolts, 33,000 lb. miscellaneous and 18,500 lb. reinforcing steel.

Ill., Chicago—City bids about July 25, constructing substructure for bridge at North Ashland Ave. Total est. $1,713,000. Final plans submitted to P.W.A. for approval. Noted July 12.

Ia., Des Moines—July 26, by E. S. Olmstead, aud. Polk Co., one 18x80 ft. pony truss with two 32 ft. and one 40 ft. I-beam approach spans. F. O. Laing, Des Moines, engr.

Massachusetts—July 24, by Comrs. Essex Co., R. R. Evans, engr., Court House, Salem, reconstructing 410 ft. wood pile and timber fender pier at Kernwood Bridge over Danvers River. To exceed $22,000.

Massachusetts—July 24, by K. C. Ford, chn. town of Sheffield, at office Dpt. P. Wks., 100 Nashua St., Boston, 50 ft. span, steel stringer bridge over Schenob Brook, Sheffield, to exceed $5,000; J. J. Shea, chn. Bd. Selectmen, Dedham, at office Dpt. P. Wks., 100 Nashua St., Boston, bituminous macadam paving 3,935 ft. hy. Dedham, to exceed $15,000; H. A. Meacham, chn., Bd. Selectmen, at office Dpt. P. Wks., 100 Nashua St., Boston, stone and tar paving 6,617 ft. hy. Dalton, to exceed $12,000.

N. J., Pennington—July 30, by State Hy. Comn., Trenton, constructing bridge over Reading R.R., Route 30, Sect. 10, incl. 567 cu.yd. found. excav. A. L. Grover, ch. elk.; adv. E.N.-R. July 19.

New York—July 26, by Triborough Bridge Authority, 111 8th Ave., New York, demolition certain buildings for Bronx Connection to Triborough Bridge along Whitlock Ave. between Leggett and Hunts Point Aves., Contr. 17; adv. E.N.-R. July 19.

†**North Carolina**—July 30, by U. S. Fisheries Biological Station, Beaufort, constructing 280 ft. pile trestle bridge at Biological Station of Bureau Fisheries, at Beaufort, Carteret Co.

Pennsylvania—July 27, at office S. S. Lewis, secy. Hys., Harrisburg, reconstructing part of bridge over Monongahela River. R-181-Monongahela City, Carroll and Forward Twps., Washington and Allegheny Counties: 5 span open spandrel type rein.-con. arch bridge, bituminous surface treated macadam surface course, 3,101 ft. R-630, Sect. R-4, Snake Spring Twp., Bedford Co. involving 23,447 cu.yd. Class 1 and 7,380 Class 2 excav., 280 ft. plate girder bridge rein.-con. paving 280 ft. R-529, Sect. 1A, Broad Top and Hopewell Twps., Bedford Co., 772 cu.yd. Class 1 and 2,285 cu.yd. Class 2 excav., 140 ft. through truss bridge, R-16, Sugarloaf Twp., Columbia Co., 750 cu.yd. Class 2 excav., two rein.-con. bridges, R-35003, Sects. 1A and 1-B, Lackawanna Co., grading, draining, 7,728 ft. rein.-con. bridge, R-331, Dubois-town Boro, Armstrong Twp., Lycoming Co., 10,150 cu.yd. Class 1, 1,052 cu.yd. Class 2 and 461 cu.yd. borrow excav.

R. I., Weekapaug (Sta. Westerly)—July 23, by Town of Westerly, constructing 3 span T-beam bridge over Broadway, P.W.A. Project 5255, Calf. 14 rein.-con. and approaches under P.W.A. minimum wage scale, calf. 21 granite and approaches under P.W.A. minimum wage scale, calf. 34 rein.-con. and approaches under prevailing wage rates in town Westerly, calf. 44 granite and approaches under prevailing wage scale in Westerly.

Virginia—July 26, by State Hy. Dpt., Richmond, constructing 212 ft. bridge over Mechums River and 65 ft. bridge over Mechunk Creek, both Albermarle Co.; 98 ft. bridge over Blackwater Creek, Lynchburg; and soil surface treating 0.8 mi. approaches to Meherrin River Bridge, Mecklenburg and Lunenburg Counties.

†**Wyoming**—July 26, by Pub. Rds., Denver, Colo., 3 bridges on Project NRI-62, on Grand Loop Hy., Yellowstone Park. J. A. Elliott, Denver, Colo., dist. engr.

Ont., Toronto—July 24, by W. J. Stewart, chn. Bd. Control, City Hall, rein.-con., steel girder bridge over Strathgowan Ave., on Mount Pleasant Rd. $249,000.

CONTRACTS AWARDED

Calif., Los Angeles — Bd. Supervs. Los Angeles Co., 1 span 75 ft. rigid steel span bridge, steel, concrete deck, steel railing, 44 ft. roadway, two 5½ ft. walks, Del Mar Ave. and Alhambra Wash, to Burrell & McKittrick, 5905 Pacific Blvd., Huntington Park, $40,282. Est. $40,000.

Ind., Hagerstown—I. W. Geer, ch. engr. (Western Region) Pennsylvania R.R. Co., at State House, Indianapolis, constructing 54 ft. deck plate girder bridge west of here, to Rumer Cooke, North High St., Columbus, O., $30,800. Bids June 26, awarded July 3. Noted June 21.

Iowa and Illinois—Davenport Bridge Comn., V. E. Hayward, secy., 322 Lane Bldg., Davenport, Ia., superstructure for Bettendorf-Moline Bridge over Mississippi River from Bettendorf, Ia., to Moline, Ill., to McClintic-Marshall Corp., Oliver Bldg., Pittsburgh, Pa., $686,798. Bids July 6. Noted June 21.

Nev., Caliente—State Hy. Comn., Carson City, bridge and approaches, near here, in Lincoln Co., to Silver State Constr. Co., Fallon, $22,942. Bids July 6, awarded July 6.

N. Y., Allegany—Erie R.R. Co., G. S. Fanning, ch. engr., Midland Bldg., Cleveland, O., eliminating College Ave. Grade Crossing on Olean-Allegany Hy., to F. W. Smith, c/o owner, $87,730. Pennsylvania R.R. Co., T. J. Skillman, ch. engr., Broad St. Station, Phila., Pa., part owner.

N. Y., East Aurora—See "Proposed Work."

N. Y., Hamburg—Erie R.R. Co., G. S. Fanning, ch. engr., Midland Bank Bldg., Cleveland, O., eliminating Big Tree Crossing, to Newhall-Herkimer Constr. Co., 5450 Hamilton Ave., Cleveland, O., $49,808. Noted June 28, under "Contracts Awarded."

Ohio—O. W. Merrell, dir. Hys., Columbus, three 40 ft. span, concrete beam bridge, and concrete paving approaches, on Sects. "J" and "Q" Toledo-Angola Rd., Fulton Co., to F. Herge, Inc., Malinta, $37,322***two 60 ft. span, concrete bridge with steel beams, over Paint Creek and brick paving approaches, on 0.0138 mi. Sect. "Washington C.H." (part) Cincinnati-Zanesville Rd., Fayette Co., to J. and E. Williams, Washington C.H., $23,439. Bids June 23. Noted June 14.

†**South Carolina**—U. S. Eng., Charleston, highway bridge at crossing of Intracoastal Waterway and U. S. Route 117, at Socastee, Harry Co., to Tidewater Constr. Co., Gloucester Point and Norfolk, Va., $102,380. Bids June 15. Noted June 7.

Oklahoma—State Hy. Dpt. Oklahoma City, I-beam bridge on concrete piers in Snyder, Kiowa Co., to W. R. Johnston, Weleetka, $19,991 est. $22,000***rein.-con. bridge in Supply, Woodward Co., to G. H. James, Beaver, $9,528 est. $12,000***steel truss bridge on concrete piers, Atoka, Atoka Co., to Boardman & Co., Maple and Hawk Sts., Oklahoma City, $38,067 est. $45,000. Grand total $67,586.

Tex., Gilmer — Upshur Co., J. R. Hinson, judge, rein.-con., timber bridge over Buie Lake on Ore City and Longview Rd., to W. C. Fowler, Gilmer, approximately $30,000.

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Bridges, etc. (Continued)

N. B., St. John West—Dpt. P. Wks., Ottawa, Ont., 302 ft. bridge between Market Pl. and Onion St., to St. John Dry Dock & Shipbuilding Co. Ltd., East St. Est. $42,000. K. M. Cameron, Ottawa, engr.

STREETS AND ROADS

BIDS ASKED

Alabama—July 28, by State Hy. Dpt., c/o L. G. Smith, dir., Montgomery, clearing, grubbing, double bit. surface treating 16.168 mi. hy., H 95, I, 11 and 111 Ext., Escambia Co., incl. 69,800 cu.yd. common excav.

†**Arizona**—Pub. Rds., Phoenix, rejected bids June 28, placing subgrade reinforcement on 4.1 mi. Route 1, Petrified Forest Natl. Monument, Apache Co. $6,595. Noted June 21.

†**California**—July 31, by C. H. Sweetser, dist. engr., Pub. Rds., 461 Market St., San Francisco, crushed graveling 19.794 mi. Sects. A, B, C and D and E, Route 5, Douglas City-Peanut Natl. Forest Hy., Trinity Natl. Forest, Trinity Co.

†**Colorado**—July 25, by Pub. Rds., Denver, Colo., fine aggregate plant mix surfacing 12.363 mi. and seal coat on 9.785 mi., Project NR-32-A-7, C-5, Berthoud Pass Forest Hy., Clear Creek and Grand Counties. J. A. Elliott, Denver, dist. engr.

Connecticut—July 23, by State Hy. Comn., J. A. Mcdonald, comr., Hartford, cold emulsion asphaltic surfacing or bituminous macadam surfacing 2,300 ft. Fountain St., New Haven, Project 13; bituminous macadam on broken stone paving 38,029 ft. Waterbury-Bristol Rd., Waterbury and Wolcott, Route 69; sheet asphalt surfacing 1,379 ft. sections Howard Ave. and Chapel St., New Haven, Project 12, foregoing P. Wks. projects; rein.-con. paving 353 ft., hy. at intersection of Route 53 with Route 58, Bethel, Trunk Line project; trap rock waterbound macadam paving 7,480 ft. Haddam Quarter and Gate Roads, Durham; loose gravel paving 4,632 ft. Newbury Hill and Tater Hill Rd., East Haddam; loose gravel surfacing 6,963 ft. Skiff Mountain, Flat Rock and Kent Hollow West Rds., Kent; rolled bank run gravel surfacing 6,050 ft. Fox Rd., Putnam; loose gravel surfacing 14,555 ft. Carrion and Kenney Hollow Rds., Union; crushed gravel waterbound macadam paving 3,900 ft. and rolled bank run gravel surfacing 4,425 ft. Norfolk Rd., Winchester, Town Aid projects.

Ia., Northwood—July 27, by M. L. Borg, aud. Worth Co., graveling 14 mi. secondary roads. T. T. Teall, Northwood, co. engr.

Kan., Atwood—See "Contracts Awarded."

Kentucky—July 26, by State Hy. Comn., Frankfort, grading, draining 1.481 mi. Elizabethtown-Leitchfield Rd., N.R.H. 147 DG, Hardin Co.; curbing, guttering, medium type surfacing 0.974 mi. street in Beaver Dam, N.R.M. 125 EC-S, Ohio Co.; beautification type of construction, incl. constructing walls, grading, surfacing Bedford-Milton Rd., N.R.H. 145 BG, Trimble Co.; bridge and surfaced approaches over Licking River between Covington and Newport, N.R.M. 320 BB, Kenton-Campbell Counties.

Kentucky—Aug. 3, by State Hy. Comn., Frankfort, surface treating 11.964 mi. Lexington-Harrodsburg Rd., M.P. 47-F, Jessamine Co.; 12.137 mi. Lexington-Harrodsburg Rd., M.P. 47-E, Mercer Co.

Massachusetts—See "Bridges and Grade Crossings."

New York—July 31, by A. W. Brandt, comr. Hys., Albany, constructing roads in Queens, Allegany, Broome, Jefferson, Rensselaer, Saratoga and Steuben Counties.

N. Y., Greenhurst—See "Contracts Awarded."

N. Y., Long Island City—July 23, by G. U. Harvey, pres. Queens Boro, Queens Subway Bldg., grading, curbing, sidewalks on 39th, 20th and 109th Aves., 183rd, 184th, Elkhorn, 99th and 125th Sts.; grading, curbing, guttering, sidewalks, sheet asphalt on concrete paving 20th Rd., Park Lane, 50th, 49th, 126th, 63rd, 75th, 162nd Sts.; grading, curbing, sidewalks, sheet asphalt on concrete paving outside railroad area and granite block on concrete paving in railroad area of Stanhope Ave.; grading, curbing, sidewalks, sheet asphalt on concrete paving Bway.; and grading, curbing, recurbing, flagging, reflagging sheet asphalt on concrete paving Queens Blvd., etc.

N. Y., New York—July 24, by S. Levy, pres. Manhattan Boro, Municipal Bldg., sheet asphalt paving Cathedral Parkway and 7th Ave., granite block repaving North Moore St.

N. Y., Warsaw—See "Contracts Awarded."

Pa., West Newton—See "Contracts Awarded."

Wash., Okanogan—July 31, by Comrs. Okanogan Co., constructing 5 mi. Secondary Hy. 10, incl. 46,834 cu.yd. earth and 2,229 cu.yd. solid rock excavation. M. P. McCoy, Okanogan, engr.

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Wash., Seattle—City bids about Aug. 2, paving Empire Way, et al., from Rainier to Henderson Sts. $190,000.

Wisconsin—July 24, by State Hy. Comn. and Polk Co., Comn., Superior, grading, draining 9.052 mi. St. Croix Falls-Milltown Rd., State Trunk Hy. 35, S.A.P. 8479, Polk Co. E. E. Parker, state hy. engr. M. Miller, co. hy. comr.

†**Wyoming**—July 25, by Pub. Rds., Denver, Colo., base course oiling 35.95 mi. Project N.R. 3-A9, B2, D3, Hoback Canyon Forest Hy., Teton and Sublette Counties. J. A. Elliott, Denver, Colo., engr.

CONTRACTS AWARDED

Ala., Talladega — Talladega Co., improving various hys., to R. T. Smith, Tallapoosa, Ga., approximately $140,000.

Calif., Los Angeles — Bd. Supervs. Los Angeles Co., improving 3.36 mi. Center St. from San Gabriel to Whittier Blvds., involving 29,149 cu.yd. excav., 583,377 sq.ft. 6 in. D.R. pavement base, 21 tons asphaltic concrete surface, 39 tons ditto base, 64,154 gal. road oil, 10 drainage structures, to G. Oswald, 366 East 58th St., $54,715. **P.W.A.** Bids June 25. Noted June 15.

Calif., San Francisco—Public Utilities Comn., repaving street or sidewalk openings of San Francisco Water Dpt., for fiscal year ending June 30, 1935, concrete and asphaltic concrete pavements, etc., to Pacific Pavements Co. Ltd., 85 Barstow St., $32,271.

†**Calif., San Rafael**—Con. Q.M., sidewalks and driveway, to F. J. Main, Fairfax, $14,526. Bids June 25.

Colorado—State Hy. Dpt. Denver, gravel surfacing 1.828 mi. hy. westerly from Limon on Colorado Springs-Limon Rd. N.R.H. 79-G, Lincoln and Elbert Counties, to J. H. and N. M. Monaghan, 332 South Race St., Denver, $51,590. **P.W.A.** Bids June 30, awarded July 7.

Conn., Bridgeport—City, bituminous macadam and concrete paving Park and Fairfield Aves., to Leverty & Hurley, 500 Waterview Ave., $45,400. F. Toquet, City Hall, engr.

Ill., Chicago—Cook Co., concrete paving 2.0218 mi. Sect. 124-0912-15-D, and 0.3264 mi. Sect. 130-2222-MFT, to E. A. Meyer Constr. Co., Glencoe, $149,585 and $22,754 respectively. Bids Feb. 27.

Ill., Decatur—Dpt. P. Wks. & Buildings, Div. Hys., to File & Collins, Decatur, bituminous filled brick paving 0.298 mi. Sect. 2-C.S., in Decatur, $28,650; 0.2973 mi. Sect. 3C.S., $18,813; 0.0612 mi. Sect. 4-C.S., $5,753; concrete paving 0.061 mi. Sect. 5-C.S., $5,709. Grand total $58,925. Bids May 28.

Ill., Dixon—Dpt. P. Wks. & Buildings, Div. Hys., concrete paving 1.9744 mi. Sect. 3-3-MFT, Lee Co., to E. M. Rocho, Freeport, $29,917. Bids June 21. Noted June 21.

Ill., Henderson—Henderson Twp., Twp. Road Comn., Galesburg, stripping and loading 24,000 cu.yd. pit gravel on various roads, to Walter Jenks, Peoria, at 17c. per cu.yd.; grading, hauling 24,000 cu.yd. gravel, by own forces, $25,000. Total est. $30,000. Bids July 6. Noted May 31.

Indiana—State Hy. Comn., Indianapolis, grading, structures, crushed stone surfacing 4.992 mi. Perry and Crawford Counties to C. Myers, Campbellsburg, $52,649. Est. $66,571. Bids June 12. Noted June 7.

Indiana—State Hy. Comn., Indianapolis, grading, concrete paving 24,739 sq.yd. Lake Co., to Albert Constr. Co., South Bend, $56,994. Est. $71,855. Bids May 29. Noted May 24.

Ind., Indianapolis — City, grading, curbing, sidewalks, concrete resurfacing 5,385 cu.yd. North Pennsylvania St., to Indiana Asphalt Paving Co., 2810 Columbia Ave., $69,752. Est. $80,173. Bids June 25. Noted May 24.

Ia., Muscatine—Muscatine Co., grading 16.82 mi. secondary roads, to H. A. Gettert, Muscatine, $19,577. Bids July 10. Noted June 28.

Kan., Atwood—City, concrete paving 12,000 sq.yd., day labor. Wilson Eng. Co., Salina, engrs.

Massachusetts—Commonwealth of Massachusetts, Dpt. P. Wks., Boston, bituminous macadam resurfacing and widening 23,341 ft. N.R.A. Project R-33, P.W.A. Docket 5284, Ashby and Fitchburg, to Fitchburg Concrete & Constr. Co., 44 Henry St., Fitchburg, $148,733. **P.W.A.** Bids June 12. Noted June 7.

Minnesota—State Hy. Dpt., St. Paul, grading 6.1 mi. S.P. 75-66-57-1, NRM 163-A, and sand and gravel lift on same road, to Western Asphalt Paving Corp., 2100 East 4th St., Sioux City, Ia., $29,648 and $28,447 respectively*** bituminous treating 7.9 mi. 71-4-31-C NRH and M 39-2-A and B, to Megarry Bros., Bain, $33,950. Grand total $92,045. **P.W.A.** Bids June 15.

Minnesota—State Hy. Dpt., St. Paul, grading 0.6 mi. State Project 7-12-38-2-A, NRH and M 426, J1, J2, to Lundin Bros., 1027 North Front St., Mankato, $18,150***0.3 mi. S.P. 33-55-22 NRM 229-0, in Cloquet, incl. 15,000 cu.yd. excav., to Whitmas, Brog & Carlson, Bovey, $7,540***0.4 mi. S.P. 55-53-21-B, NRM 22-A, 33,000 cu.yd. excav., to C. H. Peterson, 5749 Pillsbury Ave., Minneapolis, $5,786. Grand total $31,476 June 29.

Mississippi—E. D. Kenna, dir. State Hy. Comn., Jackson, grading, drainage structures, bridging, surfacing 5.248 mi. Humphreys and Holmes Co., and grading, drainage structures, bridging, bituminous surfacing 6.152 mi. Neshoba Co., to Martin-Wunderlich, Jefferson City, Mo., $113,052 and $73,385 respectively; est. $135,000 and $82,500 respectively***grading, drainage structures, bridging, paving 2.93 mi. DeSoto Co., to Walker & Michael, Memphis, Tenn., $81,159, est. $94,000***grading, drainage structures, bridging 9.745 mi. Choctaw and Webster Counties, to E. A. McCaa, Port Gibson, $66,033 est. $80,700***0.314 mi. Noxubee Co., to W. R. Striclin, Newton, $57,798 est. $62,000***4.955 mi. Okatibbee Co., and grading, drainage structures, excavation drainage and paving underpass on 7.726 mi. Lee, Pontotoc and Union Counties, to Hartman-Clark Bros., Peoria, Ill., $48,258 and $102,559 respectively; est. $55,000 and $140,000 respectively***constructing creosoted timber bridges on 5.209 mi. Monroe Co., to Delony & Tatum, Dubach, La., $6,429 est. $7,500***furnishing fine aggregate (gravel or slag) for use on 4.414 mi. Jackson-Meridian Hy., Rankin Co., to Arkhola Sand & Gravel Co., Jackson, $1,369***furnishing coarse aggregate for same project to American Sand & Gravel Co., Hattiesburg, $2,750***furnishing f.o.b. Lumberton, 1 unit structural steel span to be used for underpass on Lumberton-Purvis Hy., Lamar Co., to Highway Materials Co., Jackson, $2,460 est. $1,200. **P.W.A.** Grand total $555,252. Bids July 3, awarded July 3.

†**Montana**—B. Pub. Rds., Missoula, surfacing 10.8 mi. McDonald Pass Hy., to J. G. McLaughlin, Great Falls, $62,410. Bids May 18.

New Jersey—State Hy. Comn., Trenton, grading 4 mi. road in Burlington Co., to Riverside Concrete Co., Riverside, $219,252. Bids July 9. Noted June 28.

N. Y., Greenhurst—Chautauqua Co. and Ellery Twp. concrete and bitulithic paving 1.5 mi. highway from State Route 17 to east shore of Chautauqua Lake, day labor. $25,000. S. E. Fitch, Falconer, co. engr.

N. Y., Warsaw — Wyoming Co., improving Java-Curriers Rd., $19,000; Wethersfield Springs Rd. $16,000; Eagle-Metcalf Rd., $11,000; and Wrights Corners Rd., $18,000; also concrete bridge, $16,000, by day labor.

North Carolina — State Hy. & P. Wks., Raleigh, grading, topsoiling 6.1 mi. Rutherford Co., to Lavender Bros., Earl, $36,328*** grading 0.52 mi., Rockingham Co., to Pitt Constr. Co., Ayden, $6,006***grading, topsoiling, structures 4.08 mi. Rockingham Co., to N. L. Teer, Durham, $19,626***concrete and asphalt paving 0.44 mi. P. 1421, Halifax Co., to F. D. Cline, Raleigh, $16,222***0.52 mi. P. 5350, Guilford Co., to L. Ellis, Greensboro, $44,129***asphalt paving 0.03 mi. P. 1631, Nash Co., to R. E. Fuller, Oxford, $1,489*** bituminous surface treating 4.34 mi. Guilford Co., to Gassoway & Owen, Winston-Salem, $11,198***grading, topsoiling, crusher run stone, bituminous surface treating 6.89 mi. Rowan Co., to Kiker & Yount, Reidsville, $45,352***structures on same road, to L. S. Bradshaw, Salisbury, $5,893***culvert in Greensboro, Guilford Co., to E. W. Grannis, Fayetteville, $2,945***structures in Rutherford toward Angier, Rutherford Co., to P. Gilmore, Spartanburg, S. C., $18,735. Grand total $202,030. Bids June 27. Noted June 21.

Ohio—O. W. Merrell, dir. Hys., Columbus, concrete paving 5.147 mi. Sects "J" and "L-1" (part) Salem-Unity Rd., Columbiana Co., and 30 ft. span concrete beam bridge, over Bull Creek, Columbiana Co., to Price Constr. Co., Inc., 2702 3rd Ave., Huntington, W. Va., $152,407. Bids June 23. Noted June 14.

Oklahoma—State Hy. Dpt., Oklahoma City, cut back asphalt paving 0.41 mi. and 2.971 mi. Kiowa Co., to Park-Ward Co., 808 East 17th St., Oklahoma City, $7,651 and $48,326 respectively, est. $8,500 and $52,500 respectively*** grading, draining 1.98 mi. Atoka Co., to J. Ables, Modill, $8,377 est. $10,000***0.62 mi. Woodward Co., to G. B. Rice, Kingfisher, $4,084 est. $6,000; 3.31 mi. Comanche Co., to J. F. Smith & Sons, Noble, $13,530 est. $15,000*** 0.303 mi. in Kiowa Co. to M. A. Connelly, El Reno, $18,080, est. $20,000. Grand total $100,048.

Pa., Northampton—H. A. Guss, engr., Borough Hall, grading, curbing, storm sewers, concrete paving 37,321 sq.yd. Newport and Washington Aves., to Joe Banks Constr. Co., Wilkes-Barre, $101,981. Est. $105,000. **P.W.A.** Bids June 26.

†**Pa., Phila.**—U. S. Eng., Fort Mifflin, raising elevation 725 ft. of road and 1,400 railroad at Fort Mifflin, to Leverington Constr. Co., 332 Leverington Ave., $4,215. Bids June 7.

Pa., West Newton—City, concrete or bituminous macadam paving, curbing and drainage on 3,600 ft. city streets, labor. $25,000. **P.W.A.**

†**Tex., Fort Sam Houston**—Con. Q.M., concrete roads and storm drains, to Colglazier & Hoffman, 326 Sequin Rd., San Antonio, $92,490. Noted July 12.

†**Utah**—Pub. Rds., Salt Lake City, grading, draining, crushed surfacing 6.215 mi. Kamas-Stockmore Natl. Forest Rd., Wasatch and Uinta

†*Federal Government*

Streets and Roads (Continued)

Natl. Forests, Summit and Wasatch Counties, to Reynolds & Ely Constr. Co., Springville, $63,225. Est. $60,045. Bids June 28.

Wisconsin—State Hy. Comm., Madison, concrete surfacing 0.492 mi. Green Lake Co., to Lucty Bros., 1505 Prairie Ave., Beloit, $14,808 •••crushed stone surfacing 3.012 mi. Vernon Co., to E. A. Sturmer, Bloomington, $7,460••• grading, draining 4.513 mi. Green Lake Co., to A. J. Pagel, Almond, $29,122•••4.513 mi. Green Lake Co., to Jaeger Bros., Inc., West Bend, $7,526•••constructing 14th St. overhead, Sheboygan Co., to Eau Claire Eng. Co., Eau Claire, $102,750•••Ranthum Bridge, Washington Co., to H. B. Jahnke, Fredonia, $8,591•••concrete structures in Green Lake Co., to J. F. Bloomer, Appleton, $10,375. Grand total $180,643. Bids June 14 and July 11. Noted June 7 and July 5.

†**Wyoming**—Bureau Reclamation, Casper, extending present road 1.5 mi. at Seminoe Dam site, Casper-Alcova Project, to Sharrock & Pursel, Casper, $26,540. Bids June 8.

†**Puerto Rico**—U. S. Eng., 2.5 mi. kilometers macadam paving and 11 culverts near Vega Baja, Puerto Rico, to R. R. Pramm, $30,377. Bids June 18. 6 kilometers macadam paving and 20 culverts near Cabo Rojo, to J. Rodriguez, Lopez, $26,636. Bids June 1.

EARTHWORK IRRIGATION DRAINAGE AND WATERWAYS

PROPOSED WORK

†**California**—U. S. Eng., Post Office, rejected bids raising and strengthening existing levee and constructing 2.3 mi. new levee along south bank American River from Western Pacific R.R. to east boundary of Meister Tract, Spec. 5937. Will readvertise. Noted June 7.

Colo., Las Animas—Bent Co. Irrigation Dist. plans building diversion reservoir and laterals for 20,000 acre irrigation project. P.W.A. approved $550,000 loan and grant for same.

Ind., Jeffersonville—City plans 6.242 ft. ditch, $19,000. H. Jacobs, Jeffersonville, engr.

†**Nev., Reno**—Treas. Dpt. at office Sup. Archt., Wash., D. C., plans retaining wall along Truckee River, between Centre and Virginia Sts., for post office building. $30,000 funds alloted by P.W.A.

N. C., Morehead City—See "Unclassified."

†**Texas**—Colorado River Co., San Antonio, c/o U. S. River & Harbors Dpt., Wash., D. C., plans reservoir and dam on Colorado River, near Bluffton, for irrigation, power generation, municipal water supply, etc. $4,500,000 P.W.A. allotment granted.

†**Texas**—International Boundary Comm., El Paso, soon takes bids straightening channel in Arroyo Colorado 7 mi. long 100 ft. wide at bottom, 300 ft. wide at top. $200,000. Noted June 21.

Tex., Bay City—Matagorda Co. Conservation & Reclamation Dist. 1, c/o C. A. Erickson, Matagorda, plans dredging mouth of Colorado River. $116,300 P.W.A. allotment approved. H. J. Wilkins, Matagorda, engr.

Tex., Port Arthur—City, c/o H. O. Preston, mayor, plans seawall completion. $114,285 P.W.A. allotment approved. J. B. Converse & Co., Port Arthur, engrs.

P. E. I., Charlottetown—Dpt. Marine, Ottawa, Ont., E. Hawken, asst. deputy minister, soon takes bids repairs to wharf. $20,000.

BIDS ASKED

†**Illinois and Arkansas**—July 26, by U. S. Eng., P. O. Box 97, Memphis, Tenn., constructing 19,600 lin. ft. permeable pile dike work on Mississippi River between Cairo, Ill. and mouth of White River, Arkansas.

New Jersey—July 23, by State Hy. Comm., Trenton, repairing dikes at Racoon and Oldman's Creek adjacent to Hy. 44, Gloucester and Salem Counties, incl. 19,237 cu.yd. earth embankment. A. L. Grover, ch. clk.

†**Va., Norfolk**—Aug. 2, by U. S. Eng., constructing 155 ft. wood bulkhead, furnishing, placing 950 tons riprap stone near U. S. Weather Bureau, Cape Henry.

British Columbia—July 26, by Secretary Dpt. P. Wks., Ottawa, Ont., dredging 434,500 cu.yd. sand and silt in Fraser River (North Arm) $60,000. K. M. Cameron, Ottawa, Ont., engr.

†Federal Government.

CONTRACTS AWARDED

†**Arkansas**—U. S. Eng., Memphis, Tenn., 100,000 cu.yd. earthwork in Lower St. Francis Levee Dist. near Graves Bayou, to Kochtitzky & Johnson, Forrest City. Bids June 14.

†**Ill., Rock Island**—U. S. Eng., removing existing pins and all other metal pieces which may require moving and fabricating, erecting pins and supporting parts for pick-up device on 1 or 8 emergency bulkhead units, Dam 15 on Mississippi River, to Davenport Machine & Fdry. Co., 1628 West 4th St., Davenport, Ia., $475 for one; $3,168 for eight. Bids June 26.

†**Mich., Pentwater**—U. S. Eng., Federal Bldg., Milwaukee, Wis., dredging 48,000 cu.yd. material from entrance channel of Pentwater Harbor, to Lyons Constr. Co., Whitehall, $14,832. Bids July 3. Noted June 28.

†**New Jersey**—U. S. Eng., 2nd Dist., 39 Whitehall St., New York, dredging 109,000 cu.yd. mud, sand, gravel and clay from South River to Long Island Dredging Co., 168 North Weland Ave., Lindenhurst, N. Y., $13,614. Bids June 11. Noted June 7.

New Jersey—U. S. Eng., 2nd Dist., 39 Whitehall St., New York, repairing stone jetty and constructing steel sheet pile groin and constructing bulkhead at Manasquan Inlet, to G. Wolley & Sons, 72 Joline Ave., Long Branch, $11,145. Bids May 10. Noted May 3.

†**Tex., Galveston**—U. S. Eng., 1,500 tons rip rap protection and boat landing at Galveston Jetty Lighthouse, to J. DePuy, Milam Bldg., San Antonio, $25,515. Bids July 2.

†**Tex., San Benito**—International Boundary Comm., c/o L. M. Lawson, comr., El Paso, clearing 243 acres in Hidalgo Co. floodway system, to K. W. Bonham, Edcough, and M. Hickman, Edinburg, $12,695.

†**Washington**—Bureau Reclamation, Denver, Colo., Grand Coulee Dam and power plant in Columbia Basin, near Almira, to Silas Mason Co., 500 5th Ave., New York, N. Y., Walsh Constr. Co., 114 West 3rd St., Davenport, Ia., and Atkinson Kier Co., San Francisco, Calif., $29,339,301. Bids June 18, awarded June 14. Noted June 21.

Ont., Chatham—Dominion of Canada, dredging 50,000 cu.yd. from mouth of Thames River, deepening passage from 6 to 14 ft., to Chatham Dredging & General Contg. Co., Chatham.

UNCLASSIFIED

PROPOSED WORK

Calif., Coalinga—SWIMMING POOL—See "Public Buildings."

Calif., Oakland—DOCK—City, Port Comm., completing plans 1,300 ft. extension to dock on Outer Harbor, 100 ft. wide, concrete construction, timber apron. $540,000. P.W.A. grant of $150,000 made. Noted Jan. 25.

Calif., Stockton—GRAVEL BUNKERS—Foy Sand & Gravel Co. plans rebuilding or reconstructing gravel bunkers, completely destroyed by fire.

Calif., Ventura—WHARF—General Petroleum Corp., 108 West 2nd St., applied for War Dpt. permission, to construct steel wharf for oil well foundation extending into Pacific Ocean, 900 ft. at Punta Gorda near here. To exceed $17,500. Major H. H. Stickney, Corps of Engineers, 751 South Figueroa St., Los Angeles, engr.

Conn., Danbury—REAL ESTATE DEVELOPMENT—Birch Groves Development, Rundel & McLean, Fairview Ave., plans developing 75 acre property, incl. erection of lodge, clubhouse and residences at Candlewood Lake. Owner builds. To exceed $25,000. Private plans.

Ill., Dixon—ORNAMENTAL LIGHTING SYSTEM—City soon takes bids ornamental lighting system and street improvements, $40,000 allotted by P.W.A. T. W. Clayton, city engr.

Kan., Oswego—SWIMMING POOL—Preliminary plans prepared and application filed with P.W.A. for loan and grant to finance construction of municipal swimming pool. Total cost $36,000. Awaiting P.W.A. approval in Washington. Wilson Eng. Co., Farmers Union Bldg., Salina, engrs.

Mass., Holyoke—GAS HOLDER—City, Gas & Electric Dpt., J. J. Kirkpatrick, supt., rejected bids Apr. 17. 2,000,000 cu.ft. gas holder. P.W.A. project, $60,000 grant. Noted Apr. 12.

Mich., Alma—PIPE LINE—Mid Western Refineries, Alma, plans 13 mi. 4 in. steel pipe line in Porter Oil Fields. To exceed $17,500.

Mo., St. Louis—PARKS—City, Bd. P. Serv., City Hall, soon takes bids developing 5 new parks and playgrounds in various parts of city. $545,000. $157,000 grant allotted by P.W.A. Private plans.

Mo., Webb City—PARK—City soon takes bids municipal park, swimming pool, community assembly hall. $34,919 allotted by P.W.A. F. R. Hogdon, archt., and C. Stines, engr., both Webb City. Noted Dec. 28, 1933.

New York—GAS DISTRIBUTION SYSTEM—Keystone Gas Co., 2017 Farmers Bank Bldg., Pittsburgh, Pa., plans natural gas plant and distribution system in Delaware, Broome and Tioga Counties. To exceed $40,000. Public Service Comm. authorized project.

N. Y., Brooklyn—OIL STORAGE PLANT—Concord Oil Co., 1 Hanover Pl., bids latter part August, oil storage plant, incl. three 100,000 gal. tanks, Elizabeth St.

N. Y., Ithaca—REFORESTATION, etc.—Bd. Supervs., Tompkins Co. plans reforestation, installing electric power lines and improving highways. $200,000.

N. Y., Sherill—POWER LINES—Kenwood Electric Light Co., M. W. Keller in charge, plans electric power lines and plant. To exceed $28,000. Public Service Comm. authorized project.

N. Y., Smithtown—RADIO STATION—Mackay Radio & Telegraph Co., 67 Broad St., New York, plans by Haraden Pratt, 67 Broad St., New York, wireless and radio station (short wave) on 1,100 acre site. To exceed $100,000.

N. C., Fayetteville—TERMINALS—City, Q. K. Nimocks, mayor, plans rein.-con. terminals and galvanized metal steel dock house. $87,000. P.W.A. loan approved. W. F. Schultz, Shrine Bldg., Memphis, Tenn., designer.

N. C., Morehead City—PORT TERMINAL—Morehead City Port Terminal Comm., plans port terminal, 45 acres of land on Morehead City side of bridge across Newport River, dredging and shore arms, costing approximately $1,000,000, to be built in future. Total est. about $2,000,000. W. Carr, Durham, resident engr. Noted June 29, 1933.

R. I., Hillsgrove—AIRPORT—State, State Aviation Comm., P. W. Hathaway, chm., State House, Providence, plans improvements to state airport. P.W.A. project, $450,000. A. P. Taliaferro, Jr. & Co., 101 Park Ave., New York, engrs.

†**Tex., Brownsville** — LIGHT SYSTEM — Brownsville Navigation Dist., U. S. Government River & Harbors, Wash., D. C., plans extending electric lighting system from city to ship turning basin, and lighting distribution in turning basin district incl. poles, lines, equipment and booster plant. $100,000.

N. S., Halifax—SHEDS—Harbor Comrs. soon takes bids new sheds on Pier "B," reinforcing of quay wall, constructing 195 ft. bulkhead, 200 ft. pier and buildings for fish processing plants. $684,000.

Ont., Ste. Cartherines—TELEPHONE IMPROVEMENTS—Bell Telephone Co., preparing plans expending $250,000 telephone improvements.

Que., Three Rivers—TRANSIT SHEDS—Harbour Bd. soon takes bids constructing new transit sheds. $128,000.

BIDS ASKED

Conn., Waterbury—GOLF COURSE—City, Park Dept. taking bids completion of municipal golf course. $63,000. W. E. Styles, Waterbury, archt. R. Cairns, City Hall, engr. Noted June 21.

Miss., Jackson—SCREENING—July 30, by Comrs. State Hospital Removal, constructing 1 screening, 6 doctors residences, distribution lines to laundry. $60,000. N. W. Overstreet, Jackson, archt.

N. Y., Long Island City—COMFORT STATIONS—July 23, by G. U. Harvey, pres. Queens Boro, Queens Subway Bldg., constructing public comfort stations, electrical work, plumbing Rockaway Beach, along Boardwalk, at Beach 54th, Beach 44th, and Beach 34th Sts., Queens Boro.

N. Y., Utica—SWIMMING POOL and AIRPORT—See "Contracts Awarded."

N. Y., Brooklyn—RECREATION CENTER—Parkville Amusement Corp., 1020 Ocean Parkway, taking bids general and separate contracts, 2 story, 85x142 ft. recreation center, Ocean Parkway and Avenue J. S. Rosenblum, 10 East 40th St., New York, archt.

†**Pa., Middletown**—GASOLINE FUELING LINE—July 23, at office Con. Q.M., constructing and completing gasoline fueling system, at Air Depot; adv. E.N.-R. July 19.

Wis., Madison—CARILLON TOWER—July 27, by University of Wisconsin, J. S. Phillips, busmgr., brick, stone, sandstone carillon tower, with bells, at University. $11,600 grant allotted by P.W.A. $40,000. A. Peabody, Madison, engr. Noted Jan. 25.

CONTRACTS AWARDED

†**Calif., San Rafael**—RUNWAY—Con. Q.M., Hamilton Field, 6 in. compacted rock base runway, Hamilton Field, to Pacific State Constr. Co., 70 Call Bldg., San Francisco, $40,268.

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Unclassified (Continued)

Calif., Ventura—PIER—General Petroleum Corp., 108 West 2nd St., constructing 600 ft. steel pier extension on the Rincon, at Seacliff Oil Field, near here. Est. $75,000. Owner builds.

Conn., Bloomfield—BROADCASTING STATION—Doolittle Broadcasting Co., WDRC, Inc., 11 Asylum St., Hartford, general contract, brick, steel, 2,500 kilowatt transmitting system for broadcasting, to Allyn Wadhams Co., 15 Lewis St., Hartford***heating, to T. F. Byrnes, 31 Euclid Ave., Hartford***transmitter to Western Electric Co., 135 Wood St., West Haven***structural steel, to Builders Steel Co., Midland Ave., Hartford***steel bar joists, to Truscon Steel Co., 42 Church St., New Haven ***plumbing, to Otto Epstein, Inc., 38 Elm St., Hartford. Est. exceeds $18,000. Awarded July 2. Noted June 21.

N. J., Newark—COAL POCKETS, etc.—P. Post, 894 Bway., coal pockets and coal handling, to Nicholson Co., 420 Lexington Ave., New York. Est. exceeds $28,000.

N. Y., Brooklyn—SIGNALLING EQUIPMENT, etc.—Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, furnishing, installing block signalling and interlocking equipment for portion of Independent City-Owned Rapid Transit R.R., to General Railway Signal Co., 230 Park Ave., New York. $2,827,500***station finish work for Franklin, Nostrand, Kingston and Throop Ave. stations, to Meads Eng. Co., 217 West 14th St., New York, $187,120. Bids July 9. Noted June 21.

N. Y., Buffalo—COAL POCKETS, etc.—Philadelphia & Reading Coal & Iron Co., Phila., Pa., and Prudential Bldg., Buffalo, N. Y., coal pockets and coal loading plant, to Nicholson Co., 420 Lexington Ave., New York. Est. $28,000 or more.

N. Y., Kreischerville—BULK OIL PLANT TERMINAL, etc.—Standard Oil Co. of New York, 26 Bway., bulk oil plant terminal, etc., separate contracts; dredging, to General Contr. & Eng. Co., 40 Rector St., New York. To exceed $100,000.

N. Y., Oceanside—TANKS—Standard Oil Co. of New Jersey, 26 Bway., New York, 16 tanks (containing 335 tons steel) for bulk plant, to Chicago Bridge & Iron Co., 165 Bway., New York, and Chicago, Ill. Est. exceeds $35,000.

N. Y., Utica—SWIMMING POOL and AIRPORT—City, municipal swimming pool, Proctor Park, and improving municipal airport, by TERA labor, $120,000. J. E. Foote, city engr.

O., Cincinnati—ASPHALT PLANT—City, constructing asphalt mixing plant on Florence Ave., to Simplicity Systems Co., Riverside Dr., Chattanooga, Tenn., $50,850. **P.W.A.** Awarded June 26.

R. I., Pawtucket—RACE TRACK—M. Linenthal, engr., 250 Devonshire St., Boston, plumbing for race track buildings, Narragansett Park, to R. Renaud, 56 Cumberland St., Woonsocket; electrical work, to Federal Electric Constr. Co., 423 Dorchester Ave., South Boston, Mass., for J. F. Letendre, 304 Prospect St., Woonsocket. Awarded July 7. Noted June 7.

MATERIALS AND EQUIPMENT

PROPOSED WORK

DEEP WELL TURBINE PUMP — **Fresno, Calif.**—H. S. Foster, city clk., rejected bids June 28, furnishing 1 deep well turbine pump unit (with motor, to be installed at Water Dpt. Station 7. Will readvertise.

GARBAGE TRUCKS—**Fresno, Calif.**—J. L. Vincenz, city comr. P. Wks., plans purchasing 10 garbage trucks. $15,000. City to provide funds in budget.

CONTROL CABLE—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., rejected bids June 12, furnishing, delivering 8,300 ft. No. 12 A.W.G. 12 conductor, lead sheathed, rubber insulated control cable, Standard Spec. 199-DD per thousand ft., Spec. 1453.

STEEL PIPE—**Los Angeles, Calif.**—City, A. S. Holm, purch. agt., rejected bids July 2, 17,000 ft. 1 in. and 8,000 ft. 2 in. galvanized wrought steel pipe, 6,000 ft. 4 in. National or equal lap welded plain end steel pipe beveled 45 degrees for welding, asphalt double dipped for Park Dpt.

ROAD OIL, etc.—**Goshen, Ind.**—Bd. Comrs., Elkhart Co., F. C. Mishler, aud. Elkhart Co., soon takes bids road oil and bituminous material.

TANKS, etc.—**Rochester, Minn.**—City, A. F. Wright, clk., plans purchasing two 10,000 gal. bulk storage gas tanks, pumping equipment, and trucks. C. H. Armstrong, city engr.

BIDS ASKED

DISCONNECT SWITCHES—**Los Angeles, Calif.**—Aug. 3, by D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., sixteen 287,000 V. 1,200 Amp. 3-pole outdoor, motor gang operated disconnect switches, vertical break type for horizontal mounting with or without insulators, incl. spare parts. Spec. 1454, alternate furnishing 16 same but horizontal break, rotating type for horizontal mounting (a) f.o.b. cars Los Angeles (b) f.o.b. trucks, Los Angeles (c) 8 f.o.b. Victorville cars, and 8 f.o.b. cars Silver Lake.

TRANSFORMERS, etc.—**Los Angeles, Calif.** — Aug. 7, by D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., furnishing, delivering 4 outdoor oil-filled 138,000 V. 500-1,000/600-1,200 to 5 amp. current transformers, incl. oil, spare parts (a) f.o.b. cars bidders shipping point (b) f.o.b. cars Los Angeles (c) f.o.b. cars bidders shipping point, full freight allowed to Los Angeles, Spec. 1461; furnishing, delivering 4 oil circuit breakers capacity 0 to 10,500 R.M.S. at 138,000 V. .05 second interruption speed (2) 16 same, 0.133 seconds interruption speed, Alt. A, 16 same, 0.083 seconds interruption speed, Alt. B, 16 same to 14,600 R.M.S. at 138,000 V. 2 Alt. C, same as 2 Alt. A, but designed so as to be possibly remodeled at future date, to same as 2 Alt. B (a) f.o.b. cars Los Angeles (b) f.o.b. cars bidders factory (c) f.o.b. bidders factory, full freight allowed. Spec. 1462.

†FIRE HYDRANTS—**Wash., D. C.**—Aug. 7, by Treas. Dpt. at office Sup. Archt., Wash., D. C., new fire hydrants at National Institute of Health.

SPECIAL CASTINGS—**Chicago, Ill.**—July 25, by City, 30 and 54 in. castings for 30- to 54-in. Class B water pipe at Pipe Yard B, 3150 South Sacramento Ave.; and filing sand delivered by truck and rail required by Bureau of Engineering.

BRIDGE LUMBER, etc.—**Indiana**—July 27, by J. D. Adams, chn. State Hy. Comn., Indianapolis, 20,000 bd. ft. mixed oak bridge lumber, delivered to Dale State Hy. garage; 2,000-2,500 tons crushed aggregate, gravel or slag, at Waynedale; 350-500 tons crushed aggregate, f.o.b. Goshen; 2,100-3,000 tons crushed aggregate or gravel, on Rd. 5.

GRAVEL—**Indiana**—July 25, by J. D. Adams, chn., State Hy. Comn., Indianapolis, 25,000-45,000 tons pit run gravel and 10,000-18,000 tons stone ballast for proposed subway under New York Central tracks, Western Ave. and Walnut St., South Bend.

MAGNESIUM CHLORDIE—**Indiana**—July 25, by Indiana State Hy. Comn., Indianapolis, 25 tons magnesium chloride delivered to Clayton, J. D. Adams, chn.

PUMP and TANK—**Richmond, Ind.**—July 28, by Bd. Comrs. Wayne Co., W. H. Brooks, aud., electric water pump and tank, for Esteb Memorial Hospital.

LUMBER—**Fort Madison, Ia.**—July 25, by W. J. Tucker, aud. Lee Co., 625 pcs. 3x12-16, 715 pcs. 3x12-14 Douglas fir lumber Class D, f.o.b. Mooar, M. F. McGarland, Fort Madison, engr.

GRAVEL, etc.—**Natick, Mass.**—Town, W. F. Buffington, chn. Bd. Selectmen, taking bids furnishing several thousand tons binding gravel and fill in connection with construction of dam across Charles River at South Natick, P.W.A. project by town labor. Fay, Spofford & Thorndike, 44 School St., Boston, consult. engrs.

VALVES, etc.—**New Bedford, Mass.**—July 25, by Water Bd., Municipal Bldg., Proposal 1, furnishing two 6 in. multiple opening type air valves; Proposal 2, one 36 in. gate valve and four 12 in. tapping valves; Proposal 3, 120 lin.ft. 24 in. c.i. pipe and 16½ tons special castings for 48 in. c.i. pipe. P.W.A. Docket 2038.

WATER METERS—**Walnut Grove, Minn.**—Aug. 6 by village, 100 or more water meters with connections.

PUMPS—**Rahway, N. J.**—July 26, by State Dpt. Institutions & Agencies, State House, Trenton, 2 vertical motor driven multistate deep well pumps, at New Jersey Reformatory, $5,000. C. N. Leatham, State House, Trenton, engr.

ASPHALT HEATERS—**New York, N. Y.**—July 24, by S. Levy, pres. Manhattan Boro. Municipal Bldg., asphalt surface heaters for use in various streets and avenues in Manhattan Boro from Aug. 1 to Dec. 31, 1934.

†BOILERS—**Marietta, O.**—July 24, by Treas. Dpt. at office Sup. Archt., Wash., D. C., new heating boilers.

MINING EQUIPMENT—**Kershaw, S. C.**—Haile Gold Mines, Inc., New York, C. R. Hayes, mgr., Kershaw, in market for large supply of mining equipment to begin gold mining operations. J. T. Stevens, Kershaw, pres.

PIPE—**Columbia, S. C.**—July 25, by State Hy. Dpt., B. Sawyer, comr., large quantity reinforced concrete culvert pipe for use on U.S.P.W. Project N.R.H. and M 102-A and 194.

†EMERGENCY BULKHEAD UNIT—**Huntington, W. Va.**—July 25, by U. S. Eng., emergency bulkhead unit complete for installation, at U. S. Lock 2, Kanawha River, Belle.

†GRINDER, etc.—**Huntington, W. Va.** — July 24, by U. S. Eng., grinder, portable electric drill and drill bits, for U. S. Lock 3 (Londendale) Kanawha River.

†TESTING MACHINE, etc.—**Madison, Wis.**—Forest Service, Director Forest Products Laboratory, in market for 100,000 lb. hydraulic testing machine and furnishing, installing an automatic stress strain recorder-controller; also veneer lathe and veneer knife grinder.

MACHINE DRILLING EQUIPMENT—**Nootka Sound, B. C.**—Nootka Gold Syndicate, Ltd., in market for supply of equipment to carry on machine drilling.

MILL—**Kirkland Lake, Ont.**—H. D. Mc[illegible] of Four Nations Consolidated Gold Mines, in market for mill and construction of power line.

CONTRACTS AWARDED

CEMENT—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt., Dpt. Water & Power, 207 South Bway., furnishing cement, Spec. 1437 in such quantities as may be ordered during 3 month period from July 1, f.o.b. 29 specified points of delivery, to California Portland Cement Co., Pacific Mutual Bldg., $5,220***f.o.b. 13 specified points of delivery, to Monolith Portland Cement Co., 215 West 7th St., $3,150***f.o.b. Zones 1, 12, 13, 14, 15, 16 and 20 in Los Angeles, to Blue Diamond Corp. Ltd., 1600 South Alameda St., $2,100***f.o.b. Zone 1 in Los Angeles, to Edw. Sidebotham Sons Co., East "L" St., Wilmington, $1,300. Grand total $8,840. Noted June 21.

FIBER CONDUIT, etc.—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt., Dpt. Water & Power, 207 South Bway., 20,000 ft. 24 in. fiber conduit, to Westinghouse Electric & Supply Co., 1600 East 2nd St., $20,000; electric services, range and heater installations, to Port Electric Co., San Pedro, $5,526. Bids July 3.

INSULATORS, etc.—**Los Angeles, Calif.**—City, A. J. Holm, purch. agt., City Hall, to Ohio Brass Co., 417 South Hill St., furnishing 1,120- 11x7 in. ex. high strength, susp. insulators, 36 H.D. upper strain yokes for suspension insulators 36 H.D. lower strain yokes for same, 36 H.D. strain clamps for 1,000,000 CM cable, 36 straight adapter links, 24 H.D. strain clamps for 500,000 CM cable, 24 saddle clamps for 750,000 C.M. cable, 18 saddle clamps for 600,000 CM cable, 24 heavy duty strain clevises, 24 heavy duty suspension eyes, and 500-21 in suspension clevises, $5,829***to Westinghouse Electric & Mfg. Co., 420 South San Pedro St., 1,000-66,000 V pin type insulation, and 1,000 1¼ in. lead tips for flat wood cross arm mounting, $6,902. Bids Jan. 24. Rejected bids furnishing 450-60,000 V. bus or switch suspension insulators. Awarded July 3.

PIPE — **Los Angeles, Calif.** — Metropolitan Water Dist., S. A. Joseph, purch. agt., 10,000 ft. 22 in. I.D. fabricated pipe from 14 ga. black sheet steel, all joints welded, 1 end each length to have par. bell 3 in. long, other end plain for slip joint, 30 ft. lengths, to Consolidated Steel Corp., 6500 East Slauson St., $7,360. Bids June 27, awarded July 2.

SAND, GRAVEL, etc.—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt., Dpt. Water & Power, 207 South Bway., furnishing sand, gravel and rock in such quantities as may be ordered from July 18 to Sept. 30, 1934, f.o.b. 37 specified zones in Los Angeles, delivered to Los Angeles Dist., to Pacific Rock & Gravel Co., Rowan Bldg., $2,100***delivered in Harbor Dist., to Edw. Sidebotham & Son, 751 East "L" St., Wilmington, $1,100***delivered to San Fernando Dist., to Graham Bros., 3425 Fowler St., $1,100, foregoing Spec. 1446. Grand total $4,300. Bids June 26, awarded July 5.

STRINGING SHEAVES—**Los Angeles, Calif.**—D. P. Nicklin, pur. agt. Dpt. Water & Power, 207 South Bway., furnishing delivering 250 stringing sheaves, completely assembled, in accordance with Drawing A-35528, incl. all toolidies, patterns, forms necessary for furnishing parts f.o.b. Los Angeles, Spec. 1458, to Madson Iron Wks., 5631 Bickett St., Huntington Park, $15,375. Bids July 5, awarded July 10.

TRANSFORMERS—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., furnishing, delivering 18 outdoor 80,000 V potential transformers, incl. all necessary oil and spare parts, f.o.b. Los Angeles, to Allis-Chalmers Mfg. Co., 458 South Spring St., $40,370. Bids May 31, awarded July 10.

SAND—**Oakland, Calif.**—City Clerk, 5,000 tons each top and fine sand for city for fiscal year 1934-35, to Melrose Building Materials Co., 4501 Tidewater St., $1.53 and $1.10 respectively. Bids June 30, awarded July 3.

WIRE FABRIC—**Oakland, Calif.**—J. H. Kimball, secy. East Bay Municipal Utility Dist., 512 16th St., Oakland, furnishing 320,000 sq. ft. galvanized and welded steel wire fabric, 2x4 in. 13-gage, to California Wire Cloth Co., 585 Mission St., San Francisco, $4,736 delivered by ocean and rail, $5,152 by rail only. Bids June 27, awarded June 29.

†*Federal Government*

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Materials, etc. (Continued)

REDWOOD TIES—San Francisco, Calif.—T. A. Brooks, city purch. agt., 92,794 ft. B.M. No. 1, sawn California Redwood ties for Hetch Hetchy Municipal Water Project, to J. R. Hamfy Co., 24 Market St., at $29 per thousand ft. f.o.b. San Francisco and/or $14.75 per thousand ft. f.o.b. Humboldt Bay. Bids June 25, awarded July 3.

FLUX OIL—Chicago, Ill.—City, 100,000 gal. flux oil, to Seneca Petroleum Co., 439 West 33rd St., at 5.12c. per gal.; total $5,120. Bids June 22, awarded July 3.

GATE VALVES—Chicago, Ill.—City, two hundred 6 in., two hundred 8 in., one hundred 12 in. and forty 16 in. gate valves, to Manistee Iron Wks., 53 West Jackson Blvd., $15,446. Bids June 13, awarded July 9. Noted June 7.

JUTE PACKING—Chicago, Ill.—Dpt. P. Wks., City Hall, 5 tons jute packing for Dpt. P. Wks., to Murname Paper Co., 218 North Clinton St., $850. Bids Apr. 27, awarded July 9.

PIPE HAND RAILING—Chicago, Ill.—City, pipe hand railing for approaches to South Halsted Street Bridge over South Branch Chicago River, to Frandsen Constr. Co., 2148 Ainslie St., $2,459. Bids June 5, awarded July 3.

BRIDGE LUMBER—Indiana—State Hy. Comn., Indianapolis, 10,000 ft. white oak bridge lumber, to A. Holz, Vincennes, $340. Bids June 22.

CALCIUM CHLORIDE, etc.—Indiana—State Hy. Comn., Indianapolis, 100 tons calcium chloride and 25 tons magnesium chloride at Clayton, to Solvay Sales Co., 230 South Penn St., Indianapolis, $295***318 ft. corrugated metal pipe at Greencastle, to Canton Culvert Co., 2318 13th St., N.E., Canton, O., $201*** 800 tons gravel at Goshen, to Northern Indiana Gravel Co., Elkhart, $1,200. Grand total $1,696. Bids July 6.

CRUSHED AGGREGATE, etc.—Indiana—State Hy. Comn., Indianapolis, 1,500 tons crushed aggregate at Napoleon, to New Point Stone Co., Batesville, $2,400***3,500 tons at Lancaster, to Erie Stone Co., Bluffton, $6,125 ***1,500 tons gravel at Cumberland, to R. Hooten, Greenfield, $1,650***3,500 tons gravel at Newburgh, to Bedford-Nugent Co., Bedford, $5,828. Grand total $16,003. Bids July 2.

CRUSHED AGGREGATE—Indiana—State Hy. Comn., Indianapolis, 1,250 tons crushed aggregate, at Edgerton, to Erie Stone Co., Bluffton, $2,250***3,000 tons crushed aggregate at Tanner, to Combs & Whitaker, Owensburg, $5,250. Bids June 28. Noted June 21.

CRUSHED AGGREGATE — Indiana — State Hy. Comn., Indianapolis, 3,000 tons crushed aggregate at Spencer, to J. Quimby, Solsberry, $5,100. Bids July 2.

GRAVEL—Indiana—State Hy. Comn., Indianapolis, 500 tons gravel at Economy, to Kirpatrick Gravel Co., Vincennes, $725. Bids June 28. Noted June 21.

GRAVEL—Indiana—State Hy. Comn., Indianapolis, 800 tons gravel at Fountaintown, to R. Hooten, Greenfield, $760. Bids July 2.

METAL PIPE—Indiana—State Hy. Dpt., Indianapolis, 236 ft. corrugated metal pipe, at Worthington, to Union Iron Products Co., Lafayette, $429. Bids May 31. Noted May 24.

SHOULDER MAINTAINERS—Indiana—State Hy. Comn., Indianapolis, 35 shoulder maintainers, to Burch Corp., 330 Northeast St., Indianapolis, $9,100. Bids May 24. Noted May 21 Daily.

WOOD POSTS—Indiana—State Hy. Comn., Indianapolis, 2,000 wood posts at Linton, to T. Bane, Vincennes, $560. Bids May 14.

GRAVEL—Bluffton, Ind.—Wells Co., 2,900 tons gravel, to J. Dehner Co., Inc., Fort Wayne, $3,000.

GRAVEL—Burno City, Ind.—Bd. Comrs. Martin Co., 1,200 tons gravel, to Harding & Sons, Shoals, $1,327.

TARVIA, ROAD OIL, etc.—Huntington, Ind.—Bd. Comrs. Huntington Co., 10,000 gal. tarvia, to Highway Co., 414 Continental Bank, Indianapolis, $1,098***road oil, to Standard Oil Co., Huntington at 5.69c. per gal.***cutback asphalt, to Paving Products Co., Peru, 8.71c. per gal. Bids June 6.

GRAVEL—Loogootee, Ind.—Martin Co., 1,400 tons gravel, to G. W. Sargent, Shoals, $1,510.

REIN.-CON. PIPE, etc.—Decorah, Ia.—Winneshiek Co., 1,880 lin. ft. rein.-con. pipe and 1,880 lin. ft. plain concrete pipe, to Zeidler Concrete Products Co., Waterloo, $3,096. Bids July 2, awarded July 2.

ROAD CULVERTS—Muscatine, Ia.—Muscatine Co., 644 ft. 18- to 36-in. cross road culverts, 52 connecting bands for same, and 1,100 ft. 15 in. entrance culverts, to R. B. Leonard Co., East Peoria, Ill., $1,668. Bids July 6, awarded July 6.

†Federal Government.

CINDERS—Boston, Mass.—City, Supply Dpt., W. W. Loomis, supt., City Hall Annex, 4,500 cu.yd. cinders to Park Dpt., to J. P. McCabe, Inc., 509 East 1st St., South Boston, $4,860. Bids June 26, awarded July 9. Noted June 14.

FIRE HOSE—Boston, Mass.—City, Supply Dpt., W. W. Loomis, supt., City Hall, furnishing several thousand ft. various sized fire hose to Fire Dpt., to Fabric Fire Hose Co., Sandy Hook, Conn., $9,300. Bids June 20, awarded July 9.

READY MIXED CONCRETE—Boston, Mass.—City, Supply Dpt., W. W. Loomis, supt., City Hall Annex, 800 cu.yd. 1- to 2½- to 5 ready mixed concrete, to Boston City Hospital, to Boston Sand & Gravel Co., 118 1st St., Cambridge, $4,800. Awarded July 9.

†PUMPS—Springfield, Mass.—Commanding officer, Springfield, 2 herringbone gear pumps with by-pass, to Northern Pump Co., 135 East 42nd St., New York, at $177 each***2,000 lbs. seamless steel tubing 16½ in. long, to Austin Hastings Co., Inc., Binney St., Cambridge, $71.20 per 100 lbs.***107,000 lb. manganese acid steel, to Crucible Steel Co. of America, 118 Liberty St., Springfield. Bids May 4 and 23.

PIPE—Ortonville, Minn.—City, 1,325 lin. ft. 6 in. Class "B" c.i. pipe, to J. D. Ross & Co., Ortonville, $1,230. Bids June 20.

†CONVEYORS—St. Louis, Mo.—U. S. Eng., foot of Arsenal St., 1 chain and apron type conveyor, to St. Louis Structural Steel Co., 57th St. and B. & O. R.R. tracks, East St. Louis, Ill., $2,395; 1 gravity conveyor, to Alvey Conveyor Mfg. Co., 3201 South Bway., $160. Bids June 21.

†CEMENT—Montana—U. S. Eng., Kansas City, Mo., 200,000 bbl. portland cement for Fort Peck Dam, to Grove Lime & Cement Co., Fairfax Bldg., Kansas City, Mo. Rejected bids on 200,000 bl. cement.

†GRAVEL—Montana—U. S. Eng., Kansas City, Mo., 1,750,000 cu.yd. gravel for Fort Peck Dam, to McDowell Cooley Co., Midland Bldg., Kansas City, Mo., $2,362,500. Bids June 16. Noted May 31.

GRAVEL, etc.—Dutch Neck, N. J.—West Windsor Twp. Com., 13,760 gal. Grade A tar and 215 tons pea gravel, 407 tons screenings, to Barrett Paving Co., 28 West State St., Trenton, $2,133 and $1,540 respectively. Bids July 7.

STEEL, etc.—Raleigh, N. C.—Div. Purchase & Contr., A. S. Brower, furnishing 150 bars 20 ft. 4 in., 100 bars 20 ft. 1 in. and 10 bars 20 ft. 2 in. round H.R. axle steel, to Dillon Supply Co., 216 South West St., Raleigh, $400 ***77,030 lb. structural steel, f.o.b. Ruffin, to Dietrich Bros., Raleigh, $2,618***1,100 creosoted sign posts, to Taylor Colqui Co., Spartenburg, S. C., $740. Grand total $3,758. Bids July 2.

†CULVERT PIPE—Milwaukee, Wis.—U. S. Forest Serv., culvert pipe, to Felker Bros., Marshfield, $3,501. Bids July 6, awarded July 11.

FOREIGN

Barbados, Bridgetown—Jones & Swan in market for supply Douglas fir lumber. Lake of the Woods Milling Co., Montreal, reference.

Bermuda, Hamilton — Government making plans air base on Burt's Island, $75,000.

England—Aug. 7, by Boro Electrical Engineer, North Rd., **Lancaster,** for supply C.H.T. switchgear***Aug. 7, by Boro Electrical Engineer, George St., **Bately,** prepayment and ordinary a/c electric meters and L.T. paper insulated lead covered steel type armored cable ***Aug. 8, by Clerk Urban Dist. Council, **Elland,** supply electrically driven water boosting plant; Aug. 8, by Resident Engineer, Bursledge Reservoir, Weerhead Co., **Durham,** 250 tons c.i. pipe and specials, mostly 40 in.***Bristol,** City clerk soon takes bids municipal building, $1,500,000; **Margate** Town Clerk bids soon town hall, $1,250,000*** G. A. Joy, archt., **Bexley,** soon takes bids swimming pool $150,000***Torquay** Town Clerk soon takes bids school, $185,000***Barking** City Clerk soon takes bids school, $175,000*** **Birkenhead** City Engineer preparing plans for scheme to divert Fender and Birket Rivers into Irish Sea, incl. pumping station, $490,000*** **Leeds** City Electrical Engineer preparing plans boiler plant additions at Kirkstall, incl. power station and buildings, $675,000***Ashby-de-la-Zouch** Ministry of Health authorized construction of water supply, $170,000. Town Engineer preparing plans***Hill** City Council 25,000 kw. set comprising turbo-alternator and condenser, to C. A. Parsons & Co. Ltd., $450,000 ***A. Mather, Ellesmore St., **Swinton,** preparing plans constructing 106 houses, $212,000*** S. DeCras, **Radlett,** preparing plans and takes bids in August, 1,000 houses, $1,100,000*** Burrows & Sons, Maidstone, preparing plans 175 houses, **Tunbridge Wells,** $225,000***M. J. Gleeson Ltd., Beauchief, soon takes bids 400 houses, **Bowshaw,** $710,000.

England, London—London North Eastern Railway considering plans for use of stream line 100 m.p.h. trains. George Newnes Ltd. plans remodeling building on Southampton St., $1,000,000.

England, March—British Farina & Dextrine Ltd., March, plans starch plant, $500,000.

Finland, Petsamo—Mond Nickel Corp. plans plant; Firm accorded government rights.

France, Paris—A. Marquet, minister of Labour, bids in August for electrifying railway lines in Paris, Lemans, Tours, Bordeaux, Eastern Metropolitan suburban system and Coloz-Chambery, 1,395,000 francs voted; also for quadrupling tracks between Paris and Dijon, and installing automatic signals and suppressing level crossings, 2,735,000 francs; constructing seaports, 315,000,000 francs.

India, Bombay—Chavannes & Co., Ltd., Menkwa Bldg., Outram Rd., interested in prices of railway supplies.

Irish Free State, Donegal—Chairman, Bd. Public Health, bids in August housing scheme, $500,000 voted.

Italy—Societe Nationale Chimica, Milan, plans chemical plant for producing metallic sodium at **Russi***Ammonica & Derwati, Milan, plan menthol plant, at **Sinigo,** $100,000***Stabilimanti de Rumianca, Turin, plans naphthalene products plant at **Turin,** $100,000. Government has granted licenses for all plants.

Mexico—Huasteca Petroleum Co., c/o Standard Oil Co. of New Jersey, 26 Bway., New York, plans steel pipe line from Mata Redonda to Cerro Azul Dist., Vera Cruz. Est. about $900,000.

Siam, Bangkok—Aug. 10, by General Manager Royal Siamese Railway, 200 metric tons Cleveland No. 3 pig iron.

South Africa, Johannesbur—Aug. 13, for supplying vacuum brake gear parts, hose pipe couplings, rolling rings, joint rings, coupling washers, valves and vertical base valves, diaphragms and piston rod gland packing rings for year ending Dec. 31, 1935.

Union Soviet Socialist Republics—Railroad Trust, Soviet Government, Moscow, or c/o Amtorg Trading Corp., 261 5th Ave., New York, new trunk railroad from Baikal to Amur, day labor. To exceed $1,000,000.

Union Socialist Soviet Republics—Soviet Government, Moscow, or c/o Amtorg Trading Co., 261 5th Ave., New York, plans dredging, docks, terminals, etc., incl. construction of new unnamed seaport on Black Sea.

Union Soviet Socialist Republics—Soviet Government, Moscow, or c/o Amtorg Trading Corp., 261 5th Ave., New York, seaports and city planning with docks, storage, transportation, etc. on Sea of Azov. To exceed $1,000,000.

Union Socialist Soviet Republic—Soviet Government, Moscow, c/o Amtorg Trading Corp., 261 5th Ave., New York, plans terminals, docks, city planning and new seaport on White Sea. To exceed $1,000,000.

U.S.S.R., Chardzhui—Cotton Textile Combine, Soviet Government, Moscow, or c/o Amtorg Trading Corp., 261 5th Ave., New York, plans cotton textile mills. $500,000 or more.

U.S.S.R., Tashkent—Tashkent Cotton Combine, c/o Soviet Government, Moscow, or c/o Amtorg Trading Corp., 261 5th Ave., New York, plans 200,000 spindle cotton textile plant. To exceed $500,000.

PUBLIC BUILDINGS

Ark., Arkadelphia—Henderson State Teachers College, State Capitol Bldg., Little Rock, rejected bids July 2, new bids about July 24, physical education building and remodelling library, incl. electric wiring, plumbing, heating, swimming pool equipment. Erhart & Eichenbaum, 1134 West 3rd St., Little Rock, archts. Noted July 5.

Ark., Clarksville—Johnson Co., H. C. Stubblefield, judge, plans by Horolson & Nelson, Fort Smith, court house and jail. $125,700. P.W.A. project.

†Ark., Fort Smith—Treas. Dpt. at office Sup. Archt., Wash., D. C., soon takes bids rein-con. brick post office and federal court building, $375,000 allotted by P.W.A.

Ark., Jonesboro—State Teachers College, V. C. Hays, pres., plans by A. N. McAninch, Pyramid Life Bldg., Little Rock, rein.-con., brick training school, engineering building and power plant $450,000. P.W.A. project.

Ark., Little Rock—School Dist., J. G. Pipkin, bus. mgr., plans by Thompson, Sanders & Ginocchio, Hall Bldg., 207 West Capitol Blvd., school, $150,000. P.W.A. project.

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Public Buildings (Continued)

Calif., Bakersfield—Kern Co. Union High School Dist. plans by C. H. Biggar, Haberfelde Bldg., new school auditorium, 3,500 seating capacity. P.W.A. approved $300,000 loan and grant.

Calif., Coalinga—Coalinga High School Dist., F. J. McCollum, secy., plans new science building and swimming pool, to be constructed at Coalinga High School. $150,000. W. D. Coates, Jr., Rowell Bldg., Fresno, archt. $120,000 bonds voted. P.W.A. allocated $43,500 for same. Noted Apr. 12.

Calif., Fresno—City commissioned W. D. Coates, Jr., archt., Rowell Bldg., to prepare plans for rein.-con. steel municipal auditorium. $400,000. Noted Jan. 11.

Calif., Los Angeles—Los Angeles Bd. Educ. plans by J. and D. Parkinson, 808 Title Ins. Bldg., reconstructing, rehabilitating and strengthening Lafayette Junior High School, main building, less auditorium and shop building, $132,160. J. G. Middleton, 808 Title Ins. Bldg., structural engr.; plans by same architects, reconstructing, rehabilitating, strengthening Manual Arts high school building, $400,000. J. G. Middleton, 808 Title Ins. Bldg., structural engr. and E. L. Ellingwood, 816 West 5th St., mechanical engr.

Calif., Los Angeles—Los Angeles Bd. Educ. plans by A. C. Martin, 228 Higgins Bldg., 21 unit building replacement at Polytechnic High School. $144,800. E. L. Ellingwood, mechanical engr., and N. Patten, structural engr., H. W. Hellman Bldg., recently appointed. Noted Apr. 26.

Calif., San Mateo—San Mateo Junior College Dist. plans school additions, and general reconstruction at San Mateo and Burlingame High Schools and new Applied Arts Building. $120,000. P.W.A. approved $34,900 grant. H. Hammill, 381 Bush St., San Francisco, engr.

Conn., Fairfield—Town, J. Ferguson, Town Hall, plans 2 fire stations and fire alarm system, Greenfield Hill. $132,000. Town to vote approval. P.W.A. federal grant and loan approved.

Ill., Bloomington—Bd. Educ. plans constructing Sheridan and Lincoln Schools, repairing 5 school buildings, and resurfacing 2 playgrounds. $270,000 allotted by P.W.A. Schaefer & Hooten, Bloomington, probable archts. Noted Dec. 7.

Ill., Chicago—Art Institute of Chicago Bd. Trustees, c/o P. Palmer, pres., preliminary competition plans received, single unit brick, stone rein.-con. addition to east wing art museum and exhibition building addition to Chicago Art Museum, Michigan Ave. foot of Adams St. $500,000. Plans will be opened about July 15 for consideration of the trustees and Building Com.

Ill., Lake Forest — Deerfield Shields Twp., High School Dist. 113, North St. Johns Ave., Highland Park, rejected bids July 9, 2 and 3 story high school, East of McKinley Rd. $350,000. P.W.A. project. Anderson & Ticknor, 262 East Davenport Ave., Lake Forest, archt.

Ind., New Palestine—Town plans municipal electric light plant. C. Herrlick, New Palestine, chn.

Ia., Sioux City—Election July 30 to vote on proposal for constructing, operating and maintaining municipal light and power plant. $3,612,500. City would issue $2,500,000 bonds to help finance project and is planning to take care of balance of cost through a P.W.A. grant. Noted May 17.

Kan., Kansas City—Bd. Educ. plans by Hamilton, Fellows & Nedved, 814 Tower Bldg., Chicago, Ill., 3 story brick, rein.-con. high school, 22nd St. and Minnesota Ave. $1,800,000. P.W.A. approved $557,000 grant. Noted June 7.

†**Me., Westbrook**—Treas. Dpt. at office Sup. Archt., Wash., D. C., plans 1 story, basement, brick, steel post office. Bids on site July 22. Noted Nov. 3, 1933.

†**Mass., Peabody**—Treas. Dpt. at office Sup. Archt., Wash., D. C., plans 2 story, basement, brick, stone, concrete U. S. Post Office. $99,000 funds appropriated.

Mass., Worcester—City, G. A. MacIver, M.D., supt. City Hospital, plans by Stevens, Curtin & Mason, 45 Newbury St., Boston, 2 story, basement, irregular sized, brick hospital addition, concrete found., Chandler and Queen Sts. $168,000 P.W.A. loan and grant.

Mass., Wrentham—Town, A. W. Hale, supt. Schools, plans high school, $105,000 or more. Architect not appointed.

†**Mich., Hancock**—July 25, by Treas. Dpt. at office Sup. Archt., Wash., D. C., U. S. Post Office. Noted June 7.

†**Minn., Ah Gwah Ching**—Bureau Indian Affairs, 7th and D Sts., Wash., D. C., plans by Schmidt, Garden & Erikson, 104 South Michigan Ave., Chicago, Ill., 3 story, basement, Indian building and state sanitarium, Cass Co. $250,000. Sund & Dunham, Essex Bldg., Minneapolis, assoc. archts. G. M. Orr & Co., 408 Baker Bldg., Minneapolis, building engrs. Noted Jan. 18.

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Minn., Rochester—Voted to build library, $150,000. C. Frank, secy. Library Bd. Noted June 14.

†**Minn., Wadena**—Aug. 1, by Treas. Dpt. at office Sup. Archt., Wash., D. C., U. S. Post Office.

Mo., Greenfield—Dade Co., c/o R. D. Payne, presiding judge, soon takes bids 2½ story, basement, 70x70 ft., rein.-con. steel, stone court house. $110,000 grant and loan allotted by P.W.A. Bonsack & Pearce, Inc., 411 Olive St., St. Louis, archts. Noted Feb. 15.

Mo., Hannibal—City, c/o W. S. Watson, supt. Bd. P. Wks., soon takes bids light and power plant improvements, incl. one 7,500 kw. steam turbine generator, surface condenser with auxiliaries, foundation and other concrete work, piping and electrical wiring. $270,000. P.W.A. allotted $81,000 grant. Baumes-McDevitt, Railway Exch. Bldg., St. Louis, consult. engrs. Noted Jan. 18.

Mo., Hillsboro—Jefferson Co. soon takes bids 2 story, basement, rein.-con., brick, stone court house. $275,000 grant and loan allotted by P.W.A. Bonsack & Pearce, Inc., 411 Olive St., St. Louis, archts. Noted Mar. 22.

Mo., Independence—City, R. F. Sermon, mayor, soon takes bids municipal light and power plant addition and equipment. $187,805. $52,500 grant allotted by P.W.A. Black & Veatch, 700 Mutual Bldg., Kansas City, engrs. Noted Feb. 8.

Mo., Kansas City—Jackson Co., H. S. Truman, presiding judge, soon takes bids 2 story basement, rein.-con. brick, stone, steel detention home, 13th St. from Oak to Locust Sts. $316,000. P.W.A. allotted $86,000 grant. Keene & Simpson, 15 West 10th St., archts. Noted Dec. 7.

Mo., Kennett—City bids in August, municipal power plant. $165,000. Burns & McDonnell Eng. Co., 107 Linwood Blvd., Kansas City, Mo., engrs. Noted Feb. 1.

Mo., Liberty—Clay Co. soon takes bids 3 story, 72 x 170 ft., rein.-con., brick, stone court house. $275,000. P.W.A. allotted $75,500 grant. F. D. Wallace, 114 West 10th St., Kansas City, archt. H. A. Noble, 301 Security Bldg., Kansas City, engr. Noted Feb. 22.

†**Mo., St. Louis**—Treas. Dpt. at office Sup. Archt., Wash., D. C., soon takes bids 2 and 3 story, basement, sub-basement, 330 x 497 ft., rein.-con., brick, stone, steel post office, incl. tunnel under 18th St. to connect with Union Station. Clark Ave., Market, Moore, 17th and 18th Sts. $5,345,000 allotted by P.W.A. Klipstein & Rathmann, 316 North 8th St., archts. W. J. Knight & Co., 901 Wainwright Bldg., engrs. Noted Sept. 7.

†**Mont., Crow Agency**—Bureau Indian Affairs, 7th and D Sts., Wash., D. C., plans by Schmidt, Garden & Erikson, 104 South Michigan Ave., Chicago, Ill., hospital, Big Horn Co. $160,000.

N. Y., Auburn—City making plans power plant. $310,000 P.W.A. loan allotted. J. Tehan, city engr. Burns & McDonnell Eng. Co., 107 West Linwood Blvd., Kansas City, Mo., consult. engrs. Noted July 5.

N. Y., Cincinnatus—Village plans by R. R. Graham, 25 Prospect St., Middletown, constructing 2 story, basement, brick, steel school, plain found. $254,000 loan allotted by P.W.A. Noted Apr. 5.

N. Y., Delhi—Commissioner Education, State Education Bldg., Albany, rejected bids July 6, heating work, boilers, and pump room, equipment dairy building, New York State School of Agriculture and Domestic Science. Will readvertise.

N. Y., DeRuyter—Village sketches completed by C. W. Clark, 27 North Main St., Cortland, 2 story, basement, brick, steel high school, plain found. $145,000 loan allotted by P.W.A. Noted Mar. 29.

N. Y., Endicott—City plans by A. T. Lacey & Son, 52 Exchange St., Binghamton, for G. A. Nichols School, 2 story, basement, brick, steel, plain found. $380,000 loan allotted by P.W.A.

N. Y., Mahopac—School Dist. election soon to vote on construction grade and high school, for Village. $370,000. P.W.A. loan allotted.

N. Y., New York—Bd. Educ., 500 Park Ave., New York, plans by W. C. Martin, Flatbush Ave. extension and Concord St., Brooklyn, replacing plumbing and fixtures in P. S. 2 at 8 Henry St., $28,000; and P. S. 115 at 62 Audubon Ave., $13,000.

N. Y., Orangeburg — Dpt. Mental Hygiene, State Office Bldg., Albany, rejected bids June 20, constructing buildings at Rockland State Hospital. Noted May 24.

N. Y., Providence—Saratoga Co., G. I. Yost, clk., Ballston Spa., plans nearing completion by W. H. Vaughn, Saratoga Springs, 2 story, basement, 40x280 ft. and 40x96 ft., steel sanitarium, plain found. $250,000. E. E. Seely & Co., 101 Park Ave., New York, engrs.

N. Y., Truxton—Village plans by Hallenbeck & Sargent, Syracuse Bldg., Syracuse, steel garage and high school, plain found. $125,000 loan and grant allotted by P.W.A.
Noted Apr. 5.

N. Y., Utica—Oneida Co., Court House, plans by Bagg & Newkirk, archts. and engrs. U. G. & E. Bldg., constructing hospital building, plain found., and tunnel, $248,000.

†**O., Cleveland** — Public Wks., Emerg. Housing Corp., H. E. Ickes, P.W.A. Administrator, Wash., D. C., plans by Marc Walsh, 6709 Euclid Ave., 3 story, basement, brick, steel, concrete apartments for Slum elimination, Outhwaite Dist. $2,500,000.

Okla., Cushing—City making plans and will bids probably in September, municipal light and power plant, incl. diesel engine 2,250 hp., distribution system. $350,000. P.W.A. loan allotted. J. W. Flint, city mgr. W. R. Holway, 302 East 18th St., Tulsa, consult. engr. Noted May 31.

Okla., Pawnee—City making plans and will take bids probably in August, equipment for municipal light and power plant, incl. 900 hp. diesel engine. $60,000. P.W.A. loan and grant. O. F. Sewell, Pawnee, engr. W. R. Holway, 302 East 18th St., Tulsa, consult. engr. Noted May 3.

S. C., Westminster—City made application to P.W.A. for funds to finance installation of power plant. $110,000. City already owns distribution system and is buying current at present. Would install plant on Chauga River, Oconee Co. Ryan Eng. Co., Arcade Bldg., Columbia, engrs.

†**S. D., Fort Thompson** — Bureau Indian Affairs, 7th and D Sts., Wash., D. C., sketches by Schmidt, Garden & Erikson, 104 South Michigan Ave., Chicago, Ill., Crow Creek Agency Hospital. $100,000.

†**S. D., Wagner**—Bureau Indian Affairs, 7th and D Sts., Wash., D. C., plans by Schmidt, Garden & Erikson, 104 South Michigan Ave., Chicago, Ill., hospital at Yankton Reservation Hospital. $80,000. Site not selected.

Tenn., Cookeville—Putnam Co., plans 25 canneries throughout county, Miss F. Woodson, appointed as canning supervisor.

Tenn., Fayetteville—Lincoln Co. purchased 35 acre site for $20,000 and plans modern hospital. Architect not appointed.

Tex., Seguin—Guadalupe Co., c/o H. A. Heideke, judge, election July 28, to accept or reject government funds to build courthouse, $200,000. If issue to validate bonds and construct building carries it is planned to complete plans at once and call for bids. P.W.A. project. Noted Feb. 1.

Tenn., Tellico Plains—City plans 1 story basement school, $132,600. $138,700 P.W.A. loan and grant secured for same. Barber & McMurry, General Bldg., Knoxville, consult. archts.

†**Va., Petersburg**—Treas. Dpt. at office Supt. Archt., Wash., D. C., plans post office, $285,000. Bids July 19 for site.

†**Wash., Kelso**—Treas. Dpt. at office Sup. Archt., Wash., D. C., plans constructing U. S. Post Office, $102,000. Bids July 21 for site.

†**Wash., Mesplen**—Bureau Indian Affairs, 7th and D Sts., Wash., D. C., sketches by Schmidt, Garden & Erikson, 104 South Michigan Ave., Chicago, Ill., hospital. $180,000.

Wis., Columbus—Bd. Educ., City Hall, plans 2 story, basement, 72x156 ft. brick school, plain found. $125,000. Architect not appointed.

Wis., Manitowoc—City making plans light plant improvements. $200,000. Burns & McDonnell Eng. Co., 107 West Inwood Blvd., Kansas City, Mo., engrs.

Wis., Manitowoc—Bd. Educ. making plans heating system for high school. $15,000. Burns & McDonnell Eng. Co., 107 Linwood Blvd., Kansas City, Mo., engrs.

Ont., Ste. Catherines—P. B. Yates, chn. P. Utilities Comn., soon takes bids construction and equipment of 12,000 volt sub-station.

Sask., Regine—City plans by J. H. Portnell, new city hall and city auditorium, $1,500,000.

BIDS ASKED

†**Calif., San Diego**—July 31, by Treas. Dpt. at office Supt. Archt., Wash., D. C., for Senior Medical Officers Quarters.

†**D. C., Wash.**—July 26, by Treas. Dpt. at office Sup. Archt., Wash., D. C., acoustical treatment in U. S. Department of Agriculture Extensible Building.

D. C., Wash.—July 31, District Comrs., District Bldg., constructing Anacostia Junior High School. $490,000.

†**Fla., Miami**—July 25, by Treas. Dpt. at office Sup. Archt., Wash., D. C., special interior lighting fixtures in U. S. post office, court house and custom house, etc.

Ill., Bloomington—July 23, by Lundeen & Roozen, archts., Corn Belt Bank Bldg., fire escapes, new hollow metal doors, steel sash, millwork, smokescreens for 5 schools, for Bd. Educ. P.W.A. project. Noted July 12.

Ill., Hinsdale—July 27, by Village, c/o R. S. Hopkins, comr. P. Wks., police and fire station. $44,500 allotted by P.W.A. Harford Field, Hinsdale, archt. R. S. Hopkins, city engr.

†*Federal Government.*

Public Buildings (Continued)

Ind., Cambridge City—Aug. 6, by School Comrs., 2 story, basement, brick consolidated school. $105,000. McGuire & Shook, 1401 Fletcher Trust Bldg., Indianapolis, archts.

Ind., Indianapolis—Aug. 3, by Bd. Trustees Central Hospital for Insane, installing domestic hot water system in power house.

†Ind., Sullivan—Aug. 2, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office; adv. E.N.-R. July 19. Noted Sept. 21, 1933.

Ia., Rockford—Aug. 6, by Town, constructing municipal electric light and power plant, incl. diesel engine generating equipment, and electric distribution system. $105,000. H. L. Corey Co., 503 Baum Bldg., Omaha, Neb., engrs. Noted Apr. 6, 1933.

†Ky., Lexington—July 31, by Treas. Dpt. at office Sup. Archt., Wash., D. C., interior telephone exchange at U. S. Narcotic Farm.

†Ky., Owensboro—July 27, by Treas. Dpt. at office Sup. Archt., Wash., D. C., 1 pasenger elevator in U. S. Post Office and Court House.

†Md., Baltimore—July 31, by Treas. Dpt. at office Sup. Archt., Wash., D. C., nurses quarters at Marine Hospital.

†Md., Beltsville—July 27, by U. S. Experiment Farm, Bureau Entomology, 2 laboratories, 4 greenhouses, 4 mushroom houses, at U. S. Experimental Farm.

Mass., Concord—July 26, by Commonwealth of Massachusetts, M. J. Dee, supt. State Reformatory, West Concord, removing present tower on reformatory building and installing electric wiring, plumbing, and sprinklers. $26,000 P.W.A. loan and grant. Monks & Johnson, 99 Chauncy St., Boston, engrs. Noted Feb. 16, 1933.

Mass., Framingham—July 24, by Commonwealth of Massachusetts, Dpt. Correction, M. Van Waters, supt. Reformatory for Women, for Mothers' and Junior Inmates Cottages, each 2 story, basement, irregular sized brick, concrete, concrete founds. at Reformatory for Women. $85,000 loan and grant for Mothers Cottage and $67,000 for Junior Inmates Cottage. P.W.A. project. Monks & Johnson, 99 Chauncy St., Boston, archts.

Mass., Norfolk—July 26, by Commonwealth of Massachusetts, Dpt. Correction, Superintendent of State Prison Colony, 3 story, basement, irregular sized, brick assembly building, concrete found. at State Prison Colony. $116,000 P.W.A. loan and grant. McLaughlin & Burr, 88 Tremont St., Boston, archts. R. D. Kimball Co., 6 Beacon St., Boston, engrs. Noted Dec. 21.

Mass., Westboro—July 27, by Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, 1 story, basement, irregular sized, brick, concrete shop, at State Hospital. $32,000 P.W.A. loan and grant. Monks & Johnson, 99 Chauncy St., Boston, engrs.

Mass., Worcester—July 27, by Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, altering 3 story, basement, building and fire protection equipment at State Hospital. $111,000 P.W.A. loan and grant. Desmond & Lord, 1 Beacon St., Boston, archts. Albert B. Franklin, Inc., 38 Chauncy St., Boston, engrs.

†Minn., Worthington — Aug. 2, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office.

†Neb., Wayne—Aug. 1, by Treas. Dpt. at office Sup. Archt., Wash., D. C., post office.

N. J., Annandale—July 30, by State Dpt. Institutions & Agencies, State Bldg., Trenton, constructing 2 buildings, one for inmates and other for service building, at New Jersey Reformatory. $199,000. C. N. Leathem, State Bldg., Trenton, engr.

N. J., Mountain Lakes—Bd. Educ., bids about Aug. 15, school. $250,000. P.W.A. funds allotted. Tooker & Marsh, 101 Park Ave., New York, archts.

N. J., Skillman—July 26, by Institutions & Agencies, State Office Bldg., Trenton, constructing 400 hp. boiler, stoker and connections, underground steam conduit lines, for new buildings at State Village for Epileptics. $10,000. C. N. Leathem, Jr., State Office Bldg., Trenton, engr.

N. Y., Buffalo—Aug. 14, by Bd. Educ., City Hall, constructing Kensington High School, Suffolk St. Noted Apr. 5.

N. Y., Manhasset—Bd. Educ. bids about Aug. 15, high school. Tooker & Marsh, 101 Park Ave., New York, archts. $500,000. P.W.A. funds allotted. Noted Apr. 5.

N. Y., New York—July 27, by Dpt. Markets, Municipal Bldg., general contract 48 merchant stores, restaurant building, comfort station, farmers market, market sheds, and paving at Bronx Municipal Terminal Market, Exterior St. and East 150th St., Bronx Boro. Noted July 12.

†N. C., New Bern—Aug. 7, by Treas. Dpt. at office Sup. Archt., Wash., D. C., furnishing, installing interior lighting fixtures in U. S. Post Office, Court House and Custom House. Noted July 12.

†Federal Government.

O., Norwalk—City, W. C. Saludin, dir. P. Serv., taking bids new boiler addition to municipal light plant. $60,000. W. C. Kammerer & Associates, 823 Prospect Ave., Cleveland, consult. engrs.

†Tex., Kingsville—Aug. 7, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office; adv. E.N.-R. July 19. Noted Feb. 15.

†Vt., Beecher Falls—July 23, by Treas. Dpt. at office Supt. Archt., Wash., D. C., furnishing, installing flood lighting system at U. S. Custodian U. S. Inspection Station.

†Va., Alexandria—July 27, by City Council, W. Lawrence, mgr., constructing School. P.W.A. project.

Wis., Manitowoc—Aug. 9, by Bd. Educ., E. O. Vits, pres., 2 story, basement, 72x89 ft., brick, rein.-con., stone school plain found. Smith & Brandt, Appleton, archts. Noted July 12.

N. B., Moncton—July 26, by N. Desjardins, secy. Dpt. P. Wks., Ottawa, Ont., 3½ story, rein.-con., steel, stone building. $620,000.

Que., Canlic—July 27, by N. Desjardins, secy. Dpt. P. Wks., Ottawa, Ont., customs and immigration building and customs warehouse.

Bids Asked

The McGraw-Hill Construction Daily reports more news of "Bids Asked" than the weekly service reports. The Daily allows more bidding time. Business News Department, Engineering News-Record, 330 W. 42nd St., New York, N. Y.

Que., Lacolle—July 27, by N. S. Desjardins, secy. Dpt. P. Wks., Ottawa, Ont., customs and immigration building, and customs warehouse.

†Puerto Rico—Aug. 14, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing 2 Junior Medical Officers Quarters at U. S. Quarantine Station.

†T. H., Laulualei — Sept. 5, by Yards & Docks, Navy Dpt., Wash., D. C., constructing buildings, roads, services at Naval Radio Station, Spec. 7525; adv. E.N.-R. July 19.

†T. H., Pearl Harbor—Aug. 29, by Yards & Docks, Navy Dpt., Wash., D. C., fireproof ceiling in storehouse extension at Naval Fleet Air Base, Spec. 7700.

CONTRACTS AWARDED

Calif., Huntington Beach—Bd. P. Building, Reconstruction, State of California at office of C. B. Baldwin, 2 story, 162x267 ft., rein.con., steel school, for Central Elementary School, Palm Ave. and 17th St., to Banister-Field Co. Ltd., 4101 Goodwin Ave., Los Angeles. $189,924; electric work, to Cave Electric Co., $11,935. P.W.A. Bids June 19. Noted June 7.

Calif., Pasadena—Bd. Educ., reinforcing Jackson Elementary School, new rein.-con., gunite, plastering, painting, seating, tile floors, etc., to R. Westcott Co., 536 South Bway., $80,500. P.W.A. Bids June 26, awarded June 28. Noted Mar. 9.

†D. C., Wash.—Treas. Dpt. at office Sup. Archt., Wash., D. C., reconditioning and additional boilers at U. S. Treasury Building, to Skinker & Garrett, 1719 Eye St., $74,215.

†Idaho, Pocatello—Treas. Dpt. at office Sup. Archt., Wash., D. C., miscellaneous changes and repairs in post office and court house, to Smythe Co., 1416 F St., Wash., D. C., $3,568. Noted June 7.

†Ill., Chicago—Treas. Dpt. at office Sup. Archt., Wash., D. C., changes and additions in basement and track levels, to Henry Bro. Co., 7330 Calumet Ave., $2,880.

†Ill., Rock Island—U. S. Eng., 1 shelter house on intermediate wall of Lock 15 on Mississippi River, to P. Plambeck, 2024 Fillmore St., Davenport, Ia., $3,000. Bids July 6. Noted June 28.

†Me., South Portland—Concrete Constr. Co., general contractors, 11 Garfield Ave., Chelsea, electrical work, for office and storehouse, to W. H. Bennett Electric Co., 13 Forest St., Medford, Mass., heating and plumbing, to Fennelly & Porteous, 13 Forest St., Medford, Mass., for Treas. Dpt. at office Sup. Archt., Wash., D. C. Noted July 12, under "Contracts Awarded."

Mass., Amherst — Commonwealth of Massachusetts, F. C. Kenney, treas. Mass. State College, renovating and improving steam and electric systems, to Daniel O'Connell's Sons, Inc., 480 Hampden St., Holyoke, $82,227***furnishing turbo-generator, to General Electric Co., 140 Federal St., Boston, $20,499. P.W.A. Former contracts rescinded. Bids June 15, awarded July 10. Noted July 5, under "Contracts Awarded."

Mass., Boston—Dpt. School Buildings, W. W. Brimmey, supt. Construction, 11 Beacon St., furnishing, installing engine, piping and motor and installing new radiation in Wyman School, Washington St., Jamaica Plain, to Jas. P. Sullivan Co., 3718 Washington St., Jamaica Plain, $2,196 and $2,607, respectively***heating system in Bunker Hill School, Charlestown, to Powers & Mehegan Co., 500 Broadway, South Boston, $4,280***2 new boilers in Joseph Tuckerman School, South Boston, to M. J. Flaherty Co., 342 Newbury St., Boston, $5,167***heating system in Gaston School, South Boston, to F. W. Zemeir & Co., 140 Castle St., Boston, $1,546***grading, concrete paving at Morrison Building, on Crawford St., Roxbury, to M. Solimando, 27 School St., Boston, $2,216. Grand total $18,012. Bids July 9.

Mass., Cambridge—Chase & Gilbert Co., Inc., general contractors, Park Sq. Bldg., Boston, foundation for 1 story basement, 53x183 ft. field house, Charles River Rd., to General Foundation Co., 108 Mass. Ave., Boston***electrical work to Lord Electric Co., 303 Columbus Ave., Boston***heating and plumbing, to Downey Co., 791 Tremont St., Boston, for Massachusetts Institute of Technology, Charles River Rd., Prof. W. Emerson, chn. Building Com. and Dean of School of Architecture. Noted June 28, under "Contracts Awarded."

Mass., Dorchester—Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, oil burning equipment, for power plant at Boston State Hospital, to Acme Heating & Ventilating Co., 13 Hawkins St., Boston, $15,794. P.W.A. Awarded July 9. Noted Mar. 22, under "Contracts Awarded."

Mass., New Bedford—Matthew Cummings Co., general contractors, 43 Tremont St., Boston, electrical work for 3 story, basement, 153x161 ft. addition to Senior High School, County, Morgan Court Sts., to Kenworthy & Taylor, 11 Spaulding St., Everett, for City, Property Comn., City Hall. Noted June 14, under "Contracts Awarded."

Mass., Norfolk—Commonwealth of Massachusets, Dpt. Health, State House, Boston, general contract two 3 story, basement, irregular sized, service and hospital buildings, concrete founds., at Pondville State Hospital, to Thos. O'Connor & Co., 238 Main St., Cambridge, $237,467. General contractor awarded electrical work for both buildings, to M. B. Foster Electric Co., 514 Atlantic Ave., Boston, $15,552. P.W.A. Bids June 7, awarded July 9.

Mass., Worcester—Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, six 1 story, 16x108 ft., brick, steel balconies at State Hospital, to P. J. Keating Co., 107 Kimball St., Fitchburg, $86,302. P.W.A. Bids June 1, awarded July 9. Noted June 7 Daily.

Minn., Benson—City, boiler for municipal power plant, to Wicks Boiler Co., Saginaw, Mich., $8,386***stoker, to Combustion Eng. Co., 605 Plymouth Bldg., Minneapolis, $4,112***feed water heater, to R. B. Whitacre & Co., 205 South Robert St., St. Paul, $1,465***piping, to Donovan Constr. Co., 1725 Carroll Ave., St. Paul, $8,896***breeching and galleries, to Williams Bros. Boiler & Mfg. Co., Nicollet Island, Minneapolis, $1,530***boiler feed pump, to A. R. Roberston Co., 1603 University Ave., St. Paul, $397***coal handling equipment, to Louden Mchy. Co., 2288 University Ave., St. Paul, $3,280***brick work and boiler settings, to P. A. Laurence Co., 832 Builders Exch. Bldg., Minneapolis, $3,220***stack to Heine Engr. & Constr. Co., 713 Pence Bldg., Minneapolis, $4,047***building changes, to W. A. South Co., 219 South 9th St., Minneapolis, $8,033. Grand total $43,966.

Mo., Florence—Florence School Dist. 16 of Morgan Co., R. Eldenburg, R.F.D. 1, school, to G. A. Rector, St. Joseph. Est. $9,500. P.W.A. Bids June 7. S. B. Talbot, Gravois Mills, archt.

Mo., Fortuna—School Dist. 58, Moniteau Co., E. M. Walty, pres., 1 story, part basement, brick, concrete school, to G. A. Rector, St. Joseph. Est. $7,357. P.W.A. Bids Apr. 9.

Mo., Gardenville—Bayless Consolidate I School Dist. of St. Louis Co., Haack, pres., Mount Olive Rd., general contract 2 story, basement, 61x111 ft. and 52x82 ft. auditorium and gymnasium, for Junior High School, Weber Rd. and Hildesheim Ave., to Kellerman Contg. Co., 625 North Euclid Ave., St. Louis, $94,850***heating, to Koppen-Smith Heating Co., 2628 Olive St., St. Louis, $11,171. Bids June 25. Noted June 14.

Mo., Webster Groves—E. A. Brunson Constr. Co., general contractors, Railway Exch. Bldg., St. Louis, reinforcing steel for Douglas School addition, to Concrete Eng. Co., Loudermann Bldg., St. Louis***iron and steel, to Usona Mfg. Co., 3510 Chouteau Ave., St. Louis***roofing, to South St. Louis Slate & Tile Roofing Co., 6147 Manchester Ave., St. Louis***sheet metal work, to Mount Rose Cornice &

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Public Buildings (Continued)

Sheet Metal Wks., 726 North Euclid Ave., St. Louis***plumbing, to J. Sheehan Plumbing Co., 1609 Olive St., St. Louis***heating, to Peters-Eichler Heating Co., 1516 Pine St., St. Louis ***electrical work, to E. A. Koeneman Electric Co., 1408 Delmar Blvd., for Bd. Educ. Noted June 21.

Mo., Webster Groves — School Dist., F. Pickett, secy., altering Bristol School, 20 Gray Ave., to J. E. Williams Constr. Co., 6914 Dartmouth Ave., University City. Est. $2,600. **P.W.A.** Bids July 5.

Miss., Whitefield—C. A. Gordon, New Capitol Bldg., Jackson, completion of mechanical systems of negro group of buildings at New Insane Hospital, all heating systems, to Conlon Heating Co., Memphis, Tenn., $66,582***plumbing in Groups 1P and 2P, to Paine Heating & Tile Co., Jackson, $35,055***plumbing in Group 3P, to S. S. Richard, Jackson, $17,296 ***plumbing in Group 4P, to Davis Plumbing Co., Jackson, $14,500. Grand total $133,433. **P.W.A.** Bids May 28. Noted May 17.

Mont., Helena—Bd. Educ., general contract 2 story, basement high school, to West Coast Constr. Co., Lloyd Bldg., Seattle, $333,000. Bids July 3.

N. H., Boscawen—Comrs. Merrimack Co., A. Britton, chn., Concord, to Pieretti Bros., Centerbrook, Conn., general contract 2 story, basement, 35 x 108 ft., brick, concrete, tile almhouse and jail, $37,500***to Lee Bros., 45 North Main St., Concord, heating $10,607*** to Orr & Rolfe, 4 Bridge St., Concord, plumbing $13,860; electrical work $2,995; roofing and sheet metal $3,470***to Concord Lumber Co., East Penacook St., Concord, millwork $5,955 ***to Perry Bros. Granite Co., North State St., Concord, granite $1,074***to Lyons Iron Wks., Inc., 500 Willow St., Manchester, structural and light iron $2,927***to Truscon Steel Co., 38 Chauncy St., Boston, Mass., bar joists $1,803*** to Security Products Co., 24 Albany St., Cambridge, Mass., steel sash $2,610***to Oscar T. Trotter, Inc., 10 Whittaker St., Providence, R. I., lathe and plaster $10,557***to E. Van Noorden Co., 100 Magazine St., Roxbury, Mass., $1,155***to Rubiñ-Burke Co., 333 Washington St., Boston Mass., metal doors $1,870***to H. Newton Marshall Co., 522 Harrison Ave., Boston, Mass., painting $4,520***to Fries & Son Steel Constr. & Eng. Co., Covington, Ky., jail equipment $34,983***to Leo La Flamme, 16 Prospect St., Manchester, screens $539. Grand total $136,425. Bids May 22, awarded July 6. Noted May 10.

N. H., Portsmouth—L. H. Shattuck, Inc., general contractors, 208 Granite St., Manchester, electrical work for 3 story, basement, 35x100 ft. maternity ward to Lord Electric Co., 303 Columbus Ave., Boston, Mass.; elevator, to F. S. Payne Co., 303 Columbus Ave., Boston, Mass., for Portsmouth Hospital. E. Seybold, pres. Bd. trustees. Noted June 7, under "Contracts Awarded."

†N. J., Jersey City—Quartermaster General, Trenton, general contract armory, to E. M. Johnson, 706 Bergen Ave., $579,500***structural steel to Ettner Iron Wks., Jersey City, $200,593***heating and ventilating, to J. H. Cooney, Inc., 210 North 4th St., Harrison, $78,342*** plumbing, to Jachnig & Peoples, Inc., 221 13th Ave., Newark, $28,792***electrical work, to A. Nerini, 928 Washington Ave., $44,500. Grand total $931,727. **P.W.A.** Bids June 21. Noted June 7.

†N. J., Princeton—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to H. Hershson, 1860 Bway., New York, N. Y., $24,765. Bids June 13. Noted May 31.

†N. Y., Binghamton—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to Coath & Goss, 228 North La Salle St., Chicago, Ill., $448,220. Bids June 26.

N. Y., Jamestown—Bd. Educ., F. Rogers, secy., 4th and Pine Sts., general contract 3 story, 160x243 ft. school, to John W. Cowper Co., Rand Bldg., Buffalo, $549,000***heating and ventilating, to Chatfield & Sharp, 117 East 3rd St., $79,995***electrical work, to Lindquist Electric Co., 310 North Main St., $54,830. Grand total $683,825. **P.W.A.** Bids July 12. Noted June 28.

N. Y., Rochester—City Purchasing Agent, heating and ventilating for library for Rundel Memorial building, to Carrier Eng. Corp., 14 Franklin St., $122,028; elevators, to Graves Elevator Co., 280 Lydell Ave., $34,675. Bids June 5. Noted May 24.

†S. C., Charleston — Superintendent Lighthouses, administration building for lighthouse service, to A. K. Adams Co., 542 Plum St., Atlanta, Ga., $48,474. Bids June 22. Noted June 14.

†Tex., Breckenridge—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to H. W. Underhill Constr. Co., 235 North Waco Ave., Wichita, Kan., $62,461. Bids June 12. Noted May 24.

Utah, Provo—State Building Comn., Salt Lake City, remodeling main building State Mental Hospital to J. E. Anderson & Co., Salt Lake City, $85,171***plumbing and heating, to A. H. Walsh, Salt Lake City, $28,071***electrical work, to W. Frisby, Provo, $9,938. Grand total $123,180. Bids June 29.

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Utah, Tremonton—Box Elder Dist. Bd. Educ., Brigham City, McKinley High School addition, to E. Thompson, Salt Lake City, $15,076. **P.W.A.** Bids July 3, awarded July 3.

†Canal Zone, Albrook Field — Con. Q.M., maintenance building, paint, oil and dope house, to Grebien & Martinez, Panama City, $37,359.

COMMERCIAL BUILDINGS

PROPOSED WORK

Colo., Puebla—J. H. Cooper Enterprises, Oklahoma City, Okla., W. B. Shuttee, c/o Uptown Theatre, local mgr., plans by R. Boller c/o Boller Bros., Kansas City, Mo., brick, concrete, steel theatre, 1,200 seating capacity, 6th and Main Sts.

Conn., Bloomfield—St. Thomas's Seminary Alumni Assn., Bloomfield, plans completed by L. A. Walsh, 69 Center St., Waterbury, for 3 story, 90 x 162 ft., granite, limestone gymnasium, incl. bowling alleys, field apparatus, corrective equipment, showers, lockers, etc. To exceed $150,000. Drive started for completing funds.

Ind., Evansville—Montgomery Ward & Co., 619 West Chicago Ave., Chicago, Ill., plans by N. P. Rice, c/o owner and takes bids in about 5 weeks, 3 story, basement, mezzanine, 50x125 ft., steel, brick, stone department store, $70,000.

Ind., Freelandville—Evangelical Church plans church. Est. about $100,000. **Maturity indefinite.**

Ind., Gary—Montgomery Ward & Co., 619 West Chicago Ave., Chicago, Ill., soon lets contract remodeling 120x125 ft. department store, 739-749 Bway. $46,000. N. P. Rice, c/o owner, archt.

N. J., Newark—Prudential Life Insurance Co., 153 Halsey St., plans by E. C. Stout, engr. and archt., 153 Halsey St., four 5 story and two 6 story, brick, steel apartments, plain found., on 200x700 ft. site, 3rd Ward. $1,000,000.

N. Y., New York—Clebourne Realty Co., 610 Denver Natl. Bldg., Denver, Colo., plans by F. P. Platt & Bro., 221 West 57th St., altering plumbing and heating in store and apartment, 2745 Bway. $30,000.

N. Y., New York—Dry Dock Savings Institution, 341 Bowery, plans by M. E. Ungarleider, 191 Joralemon St., Brooklyn, elevator work, new plumbing in apartments, 307 East 7th St. $75,000.

N. Y., New York—Everett Dowd Estates, 110 West 47th St., plans by B. R. Swartburg, 2 West 46th St., new plumbing, elevators, incinerators in 5 story store and apartment, 17 West 125th St. $100,000.

N. Y., New York—Four Hundred Forty-Nine East 84th St. Corp., 108 Clarke Pl., plans by L. and L. Levy, 527 5th Ave., new plumbing and mechanical equipment in apartments, 449 East 84th St. $28,000.

N. Y., New York—J. Jemail, 40 Horatio St., plans by S. B. Histadruth, 18 East 41st St., alterinz, plumbing, heating, in 5 story apartments, 42 Horatio St. Est. about $30,000.

N. Y., New York—West Side Savings Bank, 6th Ave. and 9th St., plans by F. P. Platt & Bro., 221 West 57th St., altering heating and plumbing in 6 story apartment, 320 Manhattan Ave. $30,000.

O., Oxford—Miami University, Dr. A. H. Upham, pres., plans by Harsh & Davies, 145 North High St., Columbus, 4 story, basement, brick, rein.-con. dormitory, plain found., incl. cafeteria, recreation room, clock tower. $190,000. P.W.A. project, approval granted. Noted Aug. 3.

Wash., Vancouver — Pacific Telephone & Telegraph Co., bids about August, 2 story, 50x60 ft., brick, rein.-con. telephone building, plain found., incl. equipment. $230,000. A. H. Albertson, Wilson & Richardson, Northern Life Tower, Seattle, archts. Noted June 28.

Wis., Madison — Blessed Sacrament Parish, R. Bartholen, pastor, 2116 Hollister Ave., plans by Riley & Seberg, 24 East Mifflin St., 1 story, basement, 60x100 ft., brick church and auditorium, plain found. $125,000.

BIDS ASKED

Ariz., Grand Canyon — Atchison, Topeka & Santa Fe R.R. Co., G. W. Harris, ch. engr., 80 East Jackson Blvd., Chicago, Ill., bids about Aug. 17, 1 story, part basement, log, stucco lodge hotel. $150,000. E. A. Harrison, c/o owner, archt. Fred Harvey, Inc., c/o owner, will operate building.

N. Y., Brooklyn—See "Contracts Awarded."

N. Y., Mount Kisco—See "Contracts Awarded."

Ohio—Buckeye Co-Operative Homestead Assn., Chas. Babich and J. S. Green, 1136 Standard Bank Bldg., Cleveland, taking bids constructing subsistence farm project, Geauga and Portage Counties, incl. 500 frame houses, power plant, winery factory building, roadways, etc. $2,500,000. **P.W.A.** project. Private plans.

CONTRACTS AWARDED

Conn., New Haven—Yale University, T. [illegible] ham, construction supt., 9th residential college, Timothy Dwight unit, Temple, Grove and Wall Sts., to Marc Eidlitz & Sons, 100 East 42nd St., New York. Est. $500,000. Contractor will take bids after July 15 on various separate contracts. E. S. Harkness, James Gamble Rogers, 154 East 46th St., New York, archts.

Mass., Andover—Phillips Andover Academy, J. H. Buttimer, supt. buildings, excavating and foundation for 3 story, 40x172 ft. infirmary to M. C. Tuttle, 31 St. James Ave., Boston. Total est. exceeds $150,000. Work started. Noted May 10.

Mass., New Bedford — Maginnis & Walsh, archts., Statler Bldg., Boston, excavating and foundations for brick, stone church, Mt. Pleasant St., to W. Young, 243 Adams St., Fairhaven, for Holy Name Parish, T. P. Sweeney, pastor, 765 County St. Noted Mar. 9.

Mass., North Cambridge—J. A. McPherson, archt., 8 Irvington St., Boston, 1½ story, basement, 86x155 ft., brick, stone, granite church, concrete found., to Chas. Logue Building Co., 331 Newbury St., Boston, for Immaculate Conception Church, M. Manning, pastor. Bids June 27, awarded July 9. Noted June 28.

Mo., St. Louis—B. C. Wagner Constr. Co., general contractors, 4060 Delmar Blvd., plumbing for 2 and 3 story, basement, 90x164 ft. office and auto service station, to A. G. Mass Plumbing Co., 2824 Cherokee St., for Liberty Refining Co., 3504 Washington Ave. Noted June 21, under "Contracts Awarded."

N. Y., Brooklyn—G. Goldberg, 808 East 180th St., 6 story apartment, 196 East 17th St., 6 separate contracts, $200,000. Kavy & Kavovitt, 16 Court St., archts.

N. Y., Mount Kisco—Seven Bridges Realty Corp., dwellings, subdivision, landscaping and swimming pool, Seven Bridges Park, by separate contracts. To exceed $100,000. Private plans.

N. Y., Syracuse—Roman Catholic Church of Assumption, North Salina St., constructing parish hall, to M. Hemmer & Son, Inc., 1620 Burnet Ave.***church, to Henry Funda Constr. Co., Edison St.***rectory, to Shane Constr. Co., 1407 Wrie Blvd., all brick, steel, plain founds., North Salina St. Total est. $330,000. Noted June 28.

N. Y., Syracuse—Henry Funda Constr. Co., general contractors, Edison St., steel for church to Syracuse Eng. Co., Everson Bldg., for Assumption Church, 812 North Salina St. Noted June 28.

Ont., Hamilton—Sisters of St. Joseph, 204 Park Ave., N., new heating system, to Adam Clark, Ltd., 7 Main St. $20,000. Awarded June 26.

Ont., Toronto—George A. Fuller Constr. Co. of Canada Ltd., contractors, Metropolitan Bldg., reinforcing steel for hospital, Grosvenor St. and Surrey Pl., to Baines & David, Cherry St.***concrete columns, to Concrete Column Clamps Ltd., 105 Victoria St.***boiler, to John Inglis Co. Ltd., 14 Strahan Ave., for Women's College Hospital, 125 Rusholme St., Noted June 14, under "Contracts Awarded."

INDUSTRIAL BUILDINGS

PROPOSED WORK

California—SERVICE STATIONS—General Petroleum Co., 519 19th St., Oakland, plans steel service station at 9th and N Sts., Sacramento, California and Oake Sts., Stockton and in Forest Hill Dist., San Francisco. Est. $30,000. Private plans.

Calif., Fresno—PLANT—Sunland Sulphur Co. plans plant addition. Est. about $35,000.

Calif., Fresno—TRUCK TERMINAL, etc.—Owner, c/o architect, plans by W. D. Coates, Rowell Bldg., Fresno, 125 x 150 ft. truck terminal, storage quarters, loading and unloading platforms, etc., Golden State Hy. $40,000.

Calif., Modesto—BOTTLING PLANT—Topaz Brewery, 10th and G Sts., plans bottling plant addition, 1,000 bottles daily capacity.

Calif., Stockton—LUMBER STOCKS, WAREHOUSE, etc.—Stockton Lumber Co. plans reconstructing or rebuilding lumber stocks, warehouse, loading equipment, machinery, recently destroyed by fire. $100,000 loss.

Fla., Miami—SERVICE STATIONS, etc.—American Oil Co., Miami, soon lets separate contracts group service stations and shops, at Biscayne Blvd. (permit issued for this one) and other locations in vicinity. To exceed $30,000.

Ga., Ringgold—FILLING STATION—S. Harris, Rossville, plans by M. Mabry, Rossville, 10 brick, rein.-con. pump filling and service stations, plain founds., 3 mi. north of here. To exceed $30,000.

†Federal Government

Industrial Buildings (Continued)

Ill., Chicago—MACHINE SHOP—Mercury Mfg. Co., 4118 South Halstead St., plans by A. Epstein, 2001 West Pershing Rd., machine shop. To exceed $28,000.

Ill., Elmwood Park—FACTORY—J. F. Hanson Co., 7815 Grand Ave., plans sash factory, $28,000. Architect not appointed.

Ill., Morris—GRAIN ELEVATOR—Farmers Natl. Grain Co., 343 South Dearborn St., Chicago, rejected bids (1st unit) 1,250,000 bu. capacity grain elevator. Private plans. E. Karp, c/o owner, engr.

Ky., Carrollton — STORAGE — Independent Tobacco Co., plans tobacco storage, $30,000 or more. Architect not appointed.

Ky., Louisville—BREWERY—Clay Street Brewery, 508 South Clay St., will not improve brewery or install complete new machinery and equipment, 508 South Clay St. $125,000. Project abandoned. Noted Sept. 14, 1933.

Me., Lewiston—WAREHOUSE, etc.—Lamey-Wellehan, 110 Lisbon St., soon lets contracts 2 story, basement, 25x87 ft. brick, steel store and warehouse, Lisbon St., concrete found. Est. about $28,500. Coombs & Harriman, 11 Lisbon St., archts. Noted Feb. 15 under "Commercial Buildings."

Me., Kennebunk—SUPER SERVICE STATION—Standard Oil Co. of New York, Inc., 31 St. James Ave., Boston, Mass., soon lets contracts 1 story, brick, concrete found., incl. plumbing, electrical work, tanks, pumps, greasing pits, driveway, etc., Main St. Private plans.

Me., South Portland—BULK OIL STORAGE—Economy Oil Co., Portland, plans by G. Fuller, archt. and engr., 163 Main St., Lewiston, bulk oil storage plant, $40,000.

Mass., Cambridge — SERVICE CENTER — Colonial Beacon Oil Co., Construction Div., 26 Bway., New York, soon lets contracts 1 story, 30x40 ft., brick service center, concrete found., Prospect St. and Bway. Private plans.

Mich., Bay City — PLANT — Dow Chemical Co., Midland, plans plant alterations, $40,000 with equipment. Tanks (about 400 tons), to Carver Tank Co., East Chicago, Ind.

Mich., Flint—WAREHOUSE—Gainey Furniture Co. plans furniture warehouse, Fenton Rd. $35,000 or more. Architect not appointed.

N. Y., Brooklyn—STORAGE—Perfect Tire Co., c/o Isear & Son, 903 Dean St., plans 6 story, 100x104 ft. storage, 905 Dean St. To exceed $60,000. Architect not appointed.

N. Y., Brooklyn—STORAGE, etc.—I. Miller, 3501 Avenue D, plans by C. A. Sandblom, 145 West 45th St., New York, 100x100 ft. storage, store and theater.

N. Y., Greig—POWER PLANT—Otter Creek Power Co., c/o Northern New York Utilities, Inc., Watertown, plans electric power plant and lines here and in Lewis Co. To exceed $28,000.

N. Y., Nelliston — POWER PLANT — New York Power & Light Corp., 126 State St., Albany, plans electric power plant and distribution lines here and Montgomery Co. $28,000 or more. Public Service Comm. authorized project.

N. Y., New York—GARAGE, etc.—Columbus 67th Corp., 285 Madison Ave., deferred taking general contract bids until November (delay in obtaining permit), garage, gasoline station, 100 West 68th St. $45,000. F. P. Platt & Bro., 221 West 57th St., archts. Noted Feb. 15.

N. Y., New York—FACTORY—Plough, Inc., lessee, c/o A. Plough, Memphis, Tenn., plans alterations and equipment for cosmetics factory, $28,000 or more with equipment.

N. Y., North Tonawanda—PLANT—Becker Moore Co., North Tonawanda, plans repairing and altering plant, $35,000 or more. Architect not appointed.

N. Y., Schuylerville—PLANT—Fort Miller Pump & Paper Co., plans repairing plant. To exceed $30,000 with equipment. Architect not appointed.

O., Reading—BREWERY—Delatron Brewing Co., G. Delatron, in charge, plans new brewery, Reading and Amity Roads. To exceed $40,000.

O., Troy—FACTORY—Hobart Cabinet Co., 1 story, basement, 160x300 ft., rein.-con. factory building for manufacture of steel and wood cabinets, plain found. $85,000. Private plans.

O., Youngstown — MARKET — G. Oles, 25 South Phelps St., plans market, $28,000 or more with equipment. **Maturity indefinite.**

Pa., Pulaski—FACTORY—I. O. Hommell Co., 211—4th Ave., Pittsburgh, plans 1 story, 140x150 ft., metallic paints manufacturing building. To exceed $28,500.

S. C., Florence—STORAGE, etc.—Florence Builders Supply Co., plans storage and yard, $28,000 with equipment. Architect not appointed.

S. C., Florence—STORAGE WAREHOUSE—Oulja Furniture Co. plans storage warehouse, $30,000 or more. Architect not appointed.

Tenn., Memphis—PLANT—Plough, Inc., c/o A. Plough, 121 South 2nd St., plans cosmetics and drug manufacturing plant, $40,000 or more. Architect not appointed.

Tex., Gladewater — REFINERY PLANT — Pelican Refinery Co., Gladewater, preliminary surveys, etc, rebuilding gasoline refinery plant, $150,000. Engineer c/o owner, engr.

Wis., Rice Lake—WOOD PRODUCTS PLANT—E. Hines Lumber Co. plans wood products plant. To exceed $40,000. **Maturity indefinite.** Architect not appointed.

Alta., Vegreville—BAKERY—Wener Bakery Co. plans bakery, $25,000.

Ont., Hamilton—GRAIN ELEVATOR, etc.—Bd. Control soon takes bids grain elevator, freight terminal, coal dock and storage warehouse. $1,000,000.

Ont., St. Jacobs—FACTORY and WAREHOUSE—O. J. Schmidt plans extension to shoe factory and constructing 50x100 ft. warehouse.

Ont., Toronto—MINING DEVELOPMENT—Amalgamated Mills & Mines Ltd., c/o A. W. Ryder & Co., 21 Richmond St. W., undertaking development of mining property in Michipicoten and in-market for 25 ton unit of a 100 ton mill.

Ont., Toronto—MILL—Smelters Corp. of Canada, has taken over Tellurite Gold Mines Ltd., and plans deepening shaft and erecting mill.

BIDS ASKED

Fla., Port Everglades—BULK STORAGE—See "Contracts Awarded."

Ky., Smith's Station — DISTILLERY — See "Contracts Awarded."

Mich., Detroit—AUTO BODY PLANT—Giffels & Vallet, engrs., 604 Marquette Bldg., taking bids 2 story, brick, steel, rein.-con., plain found., for Briggs Mfg. Co. $35,000. Noted June 28.

Mich., Detroit—BREWERY STOCK HOUSE—Harley & Ellington, archts. and engrs., Stroh Bldg., bids about July 25, 5 story, double basement, 120x130 ft., brick, rein.-con., steel stock house for brewery plant addition, plain found., Gratiot Ave., for Stroh Brewing Co., Gratiot Ave. Noted June 28.

Mich., Detroit—MANUFACTURING—Superior Welding & Brazing Co., 6538 Russell St., taking bids 1 story, 80x140 ft., brick, rein.-con., steel addition, plain found., Russell St. Est. $30,000. Pollmar, Ropes & Lundy, 2539 Woodward Ave., archts.

N. J., Rahway—PLANT—Merck & Co. bids about Aug. 10, repairing and altering plant. To exceed $30,000; also plans additions, to mature later.

N. Y., Brooklyn—STORAGE, etc.—Van Wyck Amusement Corp., 1030 Park Pl., taking bids general and separate contracts 2 story storage theater, store, Liberty Ave. and Drew St. $70,000. C. A. Sandblom, 145 West 45th St., New York, archt. Noted May 17.

N. Y., Long Island City—SERVICE GARAGE, etc.—See "Contracts Awarded."

N. Y., Stillwater—See "Contracts Awarded."

O., Cincinnati—MEAT PACKING PLANT—Tietig & Lee, archts., 34 West 6th St., bids about July 23, 2 story, basement, brick, rein.-con., for Kroger Grocery & Baking Co., 35 East 7th St. $500,000. A. M. Kinney, Inc., Carew Tower, engr. Noted Apr. 19.

Ont., Toronto — GARAGE — J. A. Parrott, archt., c/o Loklaw Groceterias Co. Ltd. (owner), foot of Bathurst St., taking bids 2 story, 94x333 ft., concrete, steel, stucco, plain found., Fleet St. To exceed $28,500.

Ont., Toronto—WAREHOUSE—J. A. Parrott, archt., c/o Loklaw Groceterias Co. Ltd. (owner), foot of Bathurst St., taking bids 1 story, basement, 160x160 ft., rein.-con. addition, plain found., Fleet St. To exceed $28,500.

CONTRACTS AWARDED

Colo., Denver—PLANT—Mile High Distillery Co., South Jackson St. and Arkansas Ave., plant, to Denver Builders, Inc., 1425 Welton Ave. Est. $70,000.

Fla., Port Everglades—BULK STORAGE—Belcher Oil Co., addition to bulk storage plant, separate contracts. Est. $28,000 or more.

Ky., Smith's Station — DISTILLERY — Churchill Downs Distillery Co., Smith's Grove, or c/o C. J. Frentz, pres., 618 West Jefferson St., Louisville, various sized buildings for complete distillery on new site of 485 acres. Work is being done mostly by day labor, excepting electrical and steel work. Work started. Steel erection, to Snead Architectural Iron Wks., 10th and Hill Sts., Louisville. Total est. $150,000. L. V. Abbott, 8 Kenwood Village, Louisville, archt.

La., Baton Rouge—ALKALI MILL—Solvay Process Co., Solvay, N. Y., construction work for alkali producing plant, to United Engineers & Constructors, Inc., 1401 Arch St., Phila. Pa., $5,000,000. E. A. Barnes, ch. purch. agent, c/o Owners, to purchase equipment. Total est. $7,000,000. Noted July 5.

Mich., Detroit — MALT PLANT — American Malting Co., 1919 Dime Bank Bldg., general contract 2 and 4 story, basement, rein.-con., brick, rein.-con. malt plant, incl. malt house, 500,000 bu. capacity grain elevators, dry kiln floors, office building and power plant, plain founds., Dix Ave., to Galland-Hemming Mfg. Co., 229 East Wisconsin Ave., Milwaukee, Wis.; excavation, to J. M. Hughes Co., 333 Hudson Ave., Detroit. Est. $500,000. G. A. Mueller, 1001 American Radiator Bldg., Detroit, archts.

Mich., Detroit — BREWERY — Independent Brewing Co., 814 Penobscot Bldg., 1, 2 and 4 story, rein.-con., brick, steel brewery, Central Ave., to H. G. Jarman Co., 645 Randolph St. Est. about $150,000. Private plans.

Mich., Detroit—BREWERY—Pfeiffer Brewing Co., 3700 Beaufait St., 1 story, basement, 40x100 ft., brick, steel, rein.-con. brewery addition for storage and bottling plant, to A. A. Smith, 439 Penobscot Bldg. Est. $65,000. Noted Aug. 31.

Mich., Grand Rapids—MILL ELECTRIFICATION—American Boxboard Co., Grand Rapids, electrical equipment for mill electrification, to Westinghouse Electric & Mfg. Co., 30 Rockefeller Plaza, New York. $120,000.

Mo., Kansas City—BREWERY—M. K. Goetz Brewing Co., 6th and Albemarle Sts., St. Joseph, 3 and 6 story, basement, rein.-con. brick, stone, steel to Lonsdale Bros., Telephone Bldg. Est. $500,000. Noted June 28.

Mo., St. Louis—FACTORY—E. Landau, c/o T. C. Brinkman, archt., 2124 Victor St., 1 and 2 story, 47 x 107 x 23 x 40 ft., brick factory, stone found., 1522 South Vandeventer Ave., to F. Ahorn, 4128 East Iowa Ave.

Mo., St. Louis—GRAIN ELEVATOR—Missouri Pacific R.R. Co., S. L. Wonson, asst. ch. engr., Missouri Pacific Bldg., repairing 8 story, rein.-con. head house structure for grain elevator, 7900 Van Buren St., to E. Ahlskog Co., 407 South Dearborn St., Chicago, Ill. Noted May 31.

Montana and North Dakota — ROUND HOUSES—Northern Pacific Ry. Co., B. Blum, ch. engr., 175 East 5th St., St. Paul, Minn., 30 ft. brick, steel addition to roundhouse at Jamestown, N. D. by own forces***25 ft. brick, steel roundhouse addition at Missoula, Mont., to Colonial Constr. Co., Spokane, Wash. ***40 ft., brick, steel round house addition at St. Paul, Minn., own forces. Est. $15,000 each. Noted Apr. 5.

N. H., Keene—WAREHOUSE, etc.—S. S. Kresge, Constr. Dpt., 2727 2nd Blvd., Detroit, Mich., 2 story, basement, 42x128 ft., brick, stone, concrete found., incl. heating, plumbing, electrical work, Main St., to W. J. Handley & Co., 280 Main St., Fitchburg, Mass., to exceed $28,500. Bids July 3, awarded July 9. Noted June 28.

N. J., Linden—DISTILLERY—Distillers Co. Ltd., 620 5th Ave., New York, gin distillery, West Edgar Rd., to Turner Constr. Co., Graybar Bldg., New York. Est. $600,000. Noted July 5.

N. Y., Cohoes—FACTORY—Cohoes Rolling Mill Co., factory, to G. F. Wertime, Inc., Trull St. Private plans. Awarded early in July. Noted Feb. 22.

N. Y., Long Island City—SERVICE GARAGE—A. D. and R. Bartholomew, 69-47 Astoria Blvd., 100x100 ft. service garage, $28,000; factory, $30,000; and 2 story, 30x150 ft. coal pockets at 11th St. and Long Island, R. R. Yards, separate contracts.

N. Y., New York—STORAGE, SHOP, etc.—Windsor Productions Ltd., 321 West 44th St., storage shop, dressing rooms, etc., 234 West 52nd St., to S. Lustbader, 119 West 57th St. Est. $60,000. Noted June 28.

N. Y., Plattsburg—FACTORY and WAREHOUSE—Berst, Foster & Dixfield Co., Oswego, 1 story, basement, 100x134 ft. factory and 1 story, basement, 160x300 ft. warehouse, both steel, plain founds., to J. Leck Co., Inc., Plattsburg, N. Y., and Minneapolis, Minn., $50,000 and $75,000 respectively. H. F. Hallock, Oswego, engr. and archt.

N. Y., Port Ivory—WAREHOUSE—Procter & Gamble Mfg. Co., Port Ivory, warehouse, to H. K. Ferguson, 25 West 43rd St., New York, and Cleveland, O. Contractor awarded separate contracts, incl. 250 tons structural steel, to Pittsburgh Bridge & Iron Co., Pittsburgh, Pa. Total est. $50,000 or more.

N. Y., Stillwater — ELECTRIC POWER PLANT—New York State Electric Co., Ithaca, electric power plant and distribution lines, separate contracts and day labor. $25,000 or more. Noted Mar. 15.

Wash., Yakima—CANNING PLANT—Ray Maling Co., Yakima, canning plant, to C. W. Ertz, Portland, Ore. Est. $40,000.

Man., East Selkirk—PLANT—Canadian Industries, Ltd., 1050 Beaver Hall Hill, Montreal, Que., constructing explosives plant, concrete, timber, to Carter, Halls, Aldinger Co. Ltd., Royal Bank Bldg., Winnipeg. $250,000. Noted May 10.

Ont., New Toronto—FACTORY—Jos. Wilde & Co. Ltd., general contractors, 10 Dublin St., Toronto, excavation for 1 story, brick, steel factory addition, to Liani & Co. Ltd., 69 Prescott Ave., Toronto***steel, to Dominion Bridge Co., 1139 Shaw St., Toronto, for Anaconda American Brass Ltd., 8th St. Noted July 12, under "Contracts Awarded."

Ont., Toronto—FACTORY and WAREHOUSE—Redfern Constr. Co. Ltd., general contractors, 36 Toronto St., roofing and sheet metal for 3 story addition, King and Peter Sts., to A. Mathews Ltd., 756 Adelaide St., W.; structural steel, to Hamilton Bridge Co. Ltd., foot of Spadina Ave., for Canadian Westinghouse Co. Ltd., 286 Sanford Ave. N., Hamilton. Noted July 12, under "Contracts Awarded."

†*Federal Government.*

For official proposal advertising see Searchlight Section

Constr. News page 27

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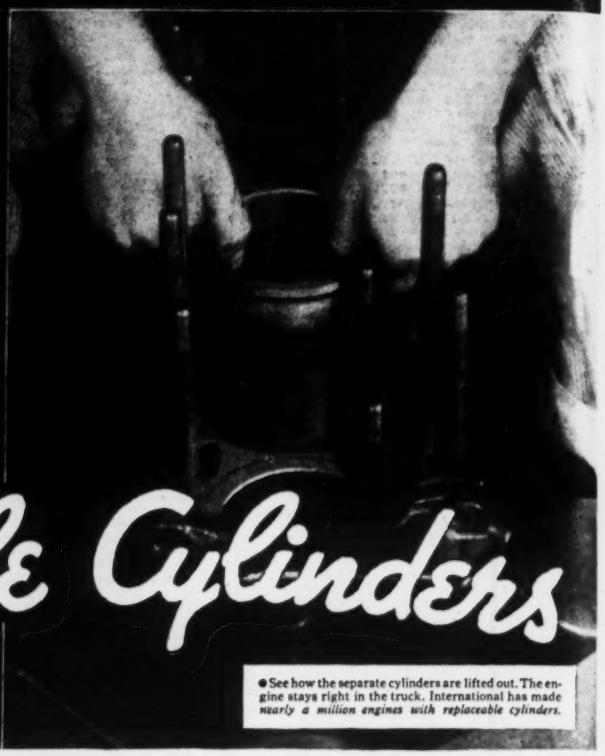

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● See how the separate cylinders are lifted out. The engine stays right in the truck. International has made *nearly a million engines with replaceable cylinders.*

IN ALL heavy-duty 6-cylinder International Trucks from 1½-ton to 7½-ton the *cylinders are individually removable and replaceable.* When the old cylinders are worn, brand-new cylinders and pistons, duplicates of the originals, are put in. The vital part of the engine is actually made as good as new. *Reboring does not renew*—each reboring changes and unbalances the engine and weakens the cylinder walls. Reboring *destroys* original coordination of parts; replacement *restores* it. Replacement—of one, or two, or all cylinders—can be speedily, easily, and economically made in an International while the engine stays in the truck. Moreover—replaceable cylinders make an International engine a better engine from the start. Its cylinder walls are machined to uniform thickness, assuring even cooling, even expansion and contraction.

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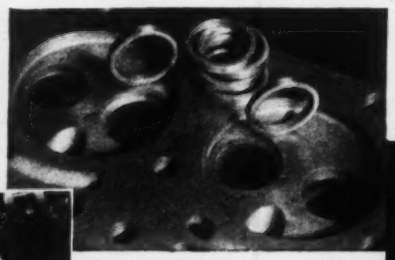

● **Above:** *Hardened Exhaust-Valve Seat Inserts.* This feature was long ago made standard International practice These inserts retard valve seat burning, engine efficiency is retained, and the valves seldom need grinding.

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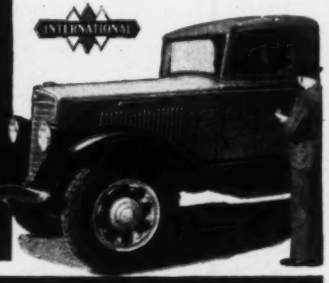

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